Agriculture
Canada

SOIL SURVEY OF HANTS COUNTY NOVA SCOTIA

SOIL SURVEY OF HANTS COUNTY NOVA SCOTIA

D.B. Cann
Canada Department of Agriculture
and
J.D. Hilchey and G.R. Smith
Nova Scotia Department of Agriculture

Report No. 5
Nova Scotia Soil Survey
Truro, Nova Scotia

Experimental Farms Service
Canada Department of Agriculture
in cooperation with the
Agricultural College, Truro
and
Nova Scotia Department of Agriculture
1954

90-05960/

Copies of this publication may be obtained from

SOILS AND CROPS BRANCH
NOVA SCOTIA DEPARTMENT OF AGRICULTURE AND MARKETING
NOVA SCOTIA AGRICULTURAL COLLEGE
TRURO
NOVA SCOTIA

©MINISTER OF SUPPLY AND SERVICES CANADA 1978

3M-38925-2:78

Printed 1954
Reprinted 1978

Donald F. Runge Limited, Pembroke, Ontario, Canada.

PREFACE

Because of public demand for information on the soils of Hants County, N.S., this soil survey has been reprinted. During the more than 20 years since the report was published, substantial changes have taken place in survey techniques, in the system of soil classification, and in soil evaluations. The latest edition of *The Canadian System of Soil Classification* is planned for publication in 1978, and will be available for $9.00 ($10.80 outside Canada) from the Publishing Centre, Supply and Services Canada, Ottawa, Ont., K1A 0S9. Your cheque or money order should be made payable in Canadian funds to: Supply and Services Canada.

Knowledge of the soils of the province has increased considerably since the survey for this report was conducted. Consequently, the Elmsdale soils in this report are referred to in more recent publications as the Wolfville soils.

The map was recompiled on a new topographic base, which has created slight discrepancies along streams and other water features. It is necessary to regard with caution the delineation of adjacent soils, such as stream floodplains.

A generalized soil map of the province was published in 1974 under the title: *Soils of Nova Scotia*. A map depicting the suitability of Nova Scotia soils for septic tanks is also available. Address your requests to: Soils and Crops Branch, Nova Scotia Department of Agriculture and Marketing, Nova Scotia Agricultural College, Truro, N.S.

ACKNOWLEDGMENT

The base maps used on the survey were supplied by the Surveys and Mapping Branch, Canada Department of Mines and Technical Surveys, Ottawa.

The draughting of the Soil Map for lithographing was done by the Cartographic Section, Field Husbandry, Soils and Agricultural Engineering Division, Central Experimental Farm, Ottawa.

The Nova Scotia Research Foundation provided a multiscope and aerial photographs of the area for the use of the survey. Prof. H. L. Cameron, of the Foundation staff, gave instruction in the use of the multiscope and offered many helpful suggestions.

Dr. P. C. Stobbe, Senior Pedologist, Central Experimental Farm, Ottawa, inspected the field work and read the manuscript. Dr. Stobbe's advice and suggestions during the course of the survey are greatly appreciated.

Messrs. D. C. McKay, K. Russell and D. Slater assisted from time to time in the field and laboratory work.

The Nova Scotia Agricultural College at Truro provided a headquarters and laboratory facilities for the work.

CONTENTS

		Page
Introduction		5
Part I.	*General Description of the Area*	5
	Location and Extent	5
	Population and Racial Origin	6
	Transportation and Markets	6
	Non-Agricultural Industries	7
Part II.	*Factors Affecting Soil Formation in Hants County*	7
	The Geological Materials from which Hants County Soils Have Been Formed	8
	Relief and Drainage	10
	Climate	12
	Vegetation	16
	Age	16
	Erosion	17
Part III.	*Classification and Description of Soils*	17
	Soil Development	17
	Soil Survey Methods	19
	Soil Classification	20
	Soil Key	20
	Discussion of Soils	22
	A. *Soils Developed from Till*	22
	Queens Catena	23
	Hantsport Catena	27
	Elmsdale Catena	30
	Pugwash Catena	32
	Truro Catena	33
	Hansford Catena	34
	Rawdon Catena	36
	Halifax Catena	38
	Gibraltar Catena	40
	B. *Soils Developed from Water-Deposited Materials*	41
	Hebert Catena	41
	Torbrook Catena	43
	Cornwallis Catena	44
	Stewiacke Catena	45
	Acadia Catena	46
	Cumberland Catena	48
	C. *Miscellaneous Soils*	49
	Swamp	49
	Peat	49
Part IV.	*Agriculture*	50
	History and Development of Agriculture	50
	Land Use and Management of Hants County Soils	52
	Land Use Capability and Productivity Rating	55
Part V.	*Discussion of Analytical Data*	59
	Summary	64

87611—2

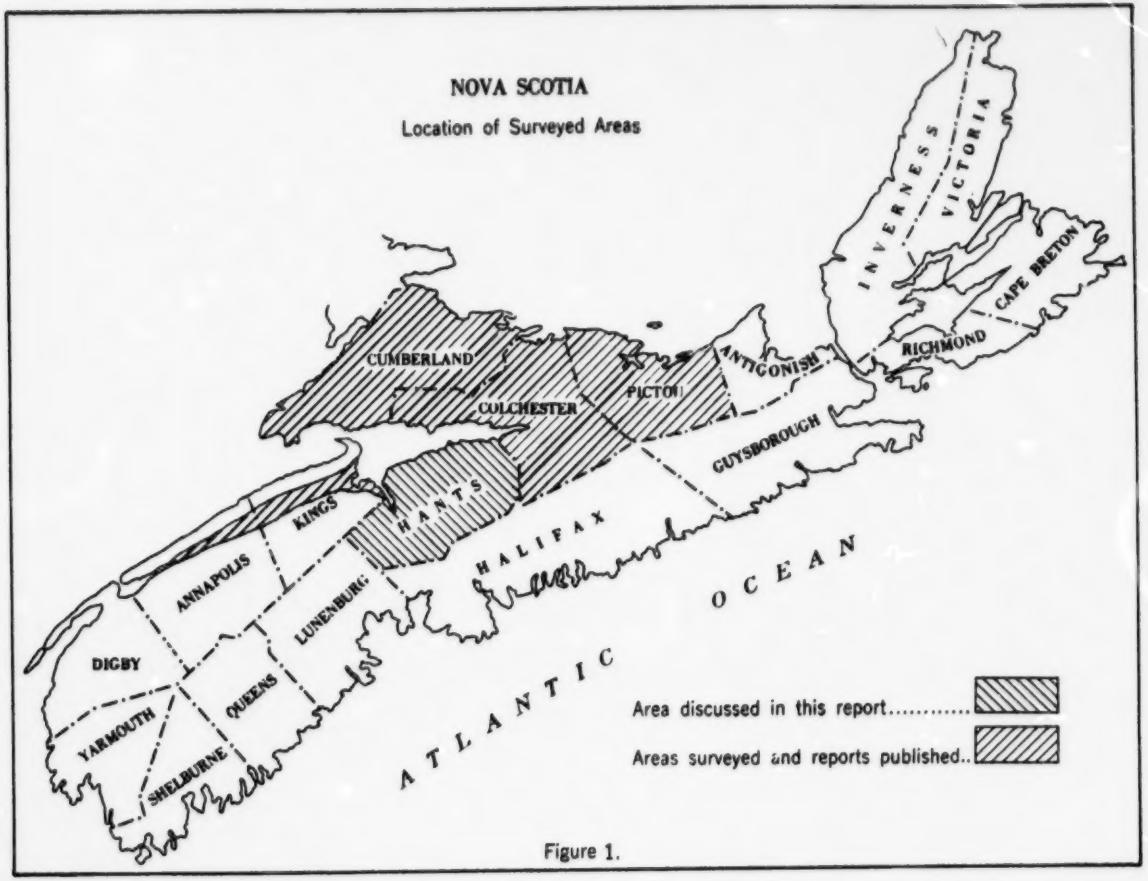

NOVA SCOTIA
Location of Surveyed Areas
INVERNESS
VICTORIA
CAPE BRETON
RICHMOND
ANTIGONISH
CUMBERLAND
COLCHESTER
PICTOU
GUYSBOROUGH
KINGS
HANTS
HALIFAX
ANNAPOLIS
LUNENBURG
DIGBY
QUEENS
YARMOUTH
SHELBURNE
ATLANTIC OCEAN
Area discussed in this report.....
Areas surveyed and reports published..

Figure 1.

INTRODUCTION

The purpose of the soil survey report is to describe the soils of an area and their relation to agriculture. This report describes the soils of Hants county and is the fifth in a series of reports on the soils of Nova Scotia. The survey of Hants county covers an area of 1,229 square miles.

The first part of the report deals with a general description of the area and contains a discussion of the various factors that influence soil formation and soil development. Various combinations of these factors result in different soils. The main body of the report is concerned with the classification and detailed description of the various soils and the characteristics that determine their usefulness for agriculture. The section on the utilization of the soil, which accompanies each soil description, should be of practical interest to the farmer.

The report contains a discussion of the agriculture of the county in its relation to the soils, and the rating of the soils according to their suitability for crop production. This rating is necessarily very general, since knowledge of the capacities of the various soils is limited. Revision of these ratings may be necessary as more information on the soils becomes available.

One of the most important parts of the report is the soil map. This map shows the location, extent and areal distribution of the different soils described and classified in the report. With the aid of this map it should be possible to identify the soils that occur in any district or community. The map is made on a scale of one inch to two miles and does not permit detailed separations such as might occur on individual farms. These variations are discussed in the text.

The soil survey report has a wide variety of uses. Its primary object is to provide farmers and agricultural workers with information about the soils of an area, but those interested in land-use planning, forest and wildlife conservation, highway construction, and geography will find useful information in its pages.

GENERAL DESCRIPTION OF THE AREA

Location and Extent

Hants county occupies a central position in the peninsula of Nova Scotia. It lies between 44°45′ and 45°20′ north latitude and between 63°25′ and 64°30′ west longitude. The northern boundary of the county is formed by the waters of Minas Basin, and it is bounded on the east by the Shubenacadie river, on the south by Halifax county and on the west by Kings and Lunenburg counties. The greatest distance from east to west is 52 miles and from north to south, approximately 34 miles.

The total area of the county is 1,229 square miles or 786,560 acres. This includes about 42 square miles of lakes and rivers, so that the actual land area approximates 1,187 square miles or 759,680 acres.

The principal town is Windsor situated on the Avon river. It has a population of 3,456 and is an important shipping point with facilities to accommodate ocean-going steamers. It is also important historically, and is an educational centre. Hantsport, also on the Avon river, is another important

87611—2½

shipping centre. Both of these towns, as well as Falmouth, are on the main line of the Dominion Atlantic Railway between the Annapolis Valley and Halifax about 50 miles distant. Other thriving villages include Shubenacadie, Walton, Kennetcook, Gore, Noel Shore, Scotch Village, Rawdon, and Maitland. These are chiefly centres of farming or mining districts.

Population and Racial Origin

The census of 1941 gives the population of Hants county as 22,034. Of these, 17,691 or 80·2 per cent were classed as rural and the remaining 19·9 per cent as urban. There has been little change in the population over a long period of years, there being 21,301 persons in 1871 and 22,034 persons in 1941. Throughout the intervening years the population decreased or increased about 2,000 every ten-year period. About 79 per cent of the urban population is centred in Windsor.

The population derives chiefly from British Isles races, since a large number of the original settlers were Loyalists. The distribution by racial origin as given by the 1941 Census of Canada is shown in Table I.

TABLE I—RACIAL ORIGIN OF THE HANTS COUNTY POPULATION

English	10,852		
Irish	3,047		
Scottish	5,616		
Other British Isles races	171	19,686	89·3%
French	324		
German	458		
Netherlands	833		
All others	733	2,348	10·7%
Total		22,034	100%

Transportation and Markets

Hants county has an excellent system of roads and railways necessary for getting farm and other products to market. Coupled with these are several good shipping points on tidewater, which enable products to be shipped by water to any port in the world.

A paved highway (No. 1), which runs from Yarmouth through the Annapolis Valley, passes through Hantsport, Falmouth, Windsor, St. Croix, and Mt. Uniacke and provides these places with a main artery into the city of Halifax. A paved road runs eastward from Windsor to Brooklyn. From Brooklyn several gravel roads lead to various parts of the county. One of these through Gore and another road through Rawdon meet, at Nine Mile River, the paved highway that runs eastward to Shubenacadie. Another good gravel road runs along the entire north shore of the county through Burlington, Summerville, Cheverie, Pembroke, Walton, Minasville, Noel Shore, and Maitland to Shubenacadie. A network of gravel roads connects the villages in the interior of the county with these other main roads. Since the large part of the county south and west of the Windsor-Halifax highway is very rough, most of the roads are confined to the area north and east of the highway. A single gravel road connects Windsor with Chester on Mahone Bay in Lunenburg county, providing an outlet to the south shore of the province.

The main line of the Dominion Atlantic Railway from Yarmouth to Halifax crosses the county, following the No. 1 highway closely. A branch of this railway runs up the valley of the Kennetcook river and connects Windsor with Truro.

The fact that Hants county borders on Minas Basin gives it unusual shipping facilities to any port in the world. Hantsport, Falmouth, Windsor, Walton, Noel, and Maitland are the most important shipping points. Most of these places were well known and prosperous during the age of wooden sailing ships.

Local markets for farm produce are found in the larger towns, but a large quantity of produce is shipped to Halifax. This city, which is only 45 miles from Windsor, provides not only a market for produce, but a convenient ocean port on the Atlantic as well. There are several summer resorts along the shore which provide a seasonal market for farm produce.

Non-Agricultural Industries

Mining and lumbering are major industries in Hants county. The chief mining products are gypsum and barite, mined in the vicinity of Windsor and Walton. Gypsum is refined and shipped from Hantsport and barite from Walton; about 750,000 tons of the former are mined annually. Antimony was formerly mined at Gore and manganese in the southwestern part of the county. Gold is found in several places, the largest district being around Mt. Uniacke.

Considerable quantities of lumber and pulpwood are produced in Hants county. In 1941, 12,972 cords of pulpwood and 5,377 cords of firewood were sold. A fertilizer plant at Windsor is an important industry in the county. Other products include textiles, rock wool, and limestone.

The census of 1941 shows that there were fourteen wholesale establishments in Hants county with sales totalling $1,358,600. The Avon River Power Company maintains several electrical power stations throughout the county.

Windsor is the site of the Edgehill School for girls and Kings Collegiate School for boys, and at Shubenacadie the government maintains an Indian School.

The scenery throughout the county and the many points of historical interest are attractive to tourists who visit this county in considerable numbers during the summer months.

FACTORS AFFECTING SOIL FORMATION IN HANTS COUNTY

The formation of soil is influenced by a number of environmental factors and conditions. Chief among these are climate, type of parent materials, drainage, vegetation, relief, erosion, and time. The combined effect of these factors is called weathering. The underlying rock formations furnish the materials, which, under the effects of weathering, are transformed and produce the soils as we see them at present.

In northern latitudes the weathered material has not remained in its original location, but has been transported, mixed and redeposited by the great ice sheet that covered the area many centuries ago. This glacial drift now covers the underlying rock formations to a depth of many feet and consists of till and material deposited by glacial streams, such as outwash plains, kames, and eskers. Some materials of more recent deposition are found along the present stream courses.

Some knowledge of the origin and location of these materials is necessary in order to explain the development of the soils as they exist today. To a great extent the nature and distribution of these materials is responsible for the relief and drainage of the area.

The Geological Materials from which Hants County Soils Have Been Formed

The underlying bedrock formations in Hants county belong to four major periods in the earth's history. Their extent and distribution are shown on the accompanying sketch map.

1. *Triassic*—red sandstone.
2. *Carboniferous*
   Mississippian
   Windsor Series—reddish-brown and grey sandstone, shale and limestone; gypsum.
   Horton Series—brown and grey sandstones and shales.
3. *Devonian*—granite
4. *Pre-Cambrian*—quartzite and slate.

These rocks furnish the materials from which the present-day soils are derived. As a consequence of glaciation we may find soils developed from either one or a mixture of these rock materials.

In a general way, the nature of the soil-forming materials is associated with the two major physiographic divisions of the county—the lowland plain and the upland plain or Southern Upland. The Southern Upland extends across the southern part of the county, south and west of Windsor through St. Croix, turning northeastward to Gore and then southward to Enfield. North of this upland, the lowland plain forms a broad semicircular area extending from Windsor along Minas Basin and up the valley of the Shubenacadie river. The softer Carboniferous and Triassic rocks occupy the lowland plain and the Devonian and Pre-Cambrian rocks, the upland plain. In some places the separation between these two plains is abrupt, while in others it is obscured by foothills that merge into the higher upland.

The distribution of the various soil parent materials is shown on the sketch map in Fig. 2. On the lowland plain, sandy-textured parent materials are derived from the Triassic and Carboniferous sandstones. These materials are red to reddish-brown in color and generally have moderately rapid drainage. The Horton sandstones usually produce a coarser-textured and more stony till than the other sandstones. Parent materials derived from shales of the Windsor series have a clay loam texture and usually imperfect drainage, except where these materials are mixed with or deposited over gypsum. On these sites drainage is much better. This till, which varies in depth from 5 to 25 feet, also contains a considerable amount of grey and red sandstone fragments. Some of this material has been carried southward by the glacier and mixed with the slate, quartzite, and granite of the upland plain, particularly in the area west of Grand lake.

The Horton shales produce a dense, slowly-draining, shaly clay loam till varying in depth from a few inches to several feet. The soils developed on this material are imperfectly to poorly drained.

In general, the higher parts of the lowland plain are covered with till derived from rocks of the Windsor series and a rolling to hilly topography is common. The till derived from the Horton series of rocks occupies long slopes along the north shore, but around Cheverie and west of Windsor an undulating to rolling relief is prevalent.

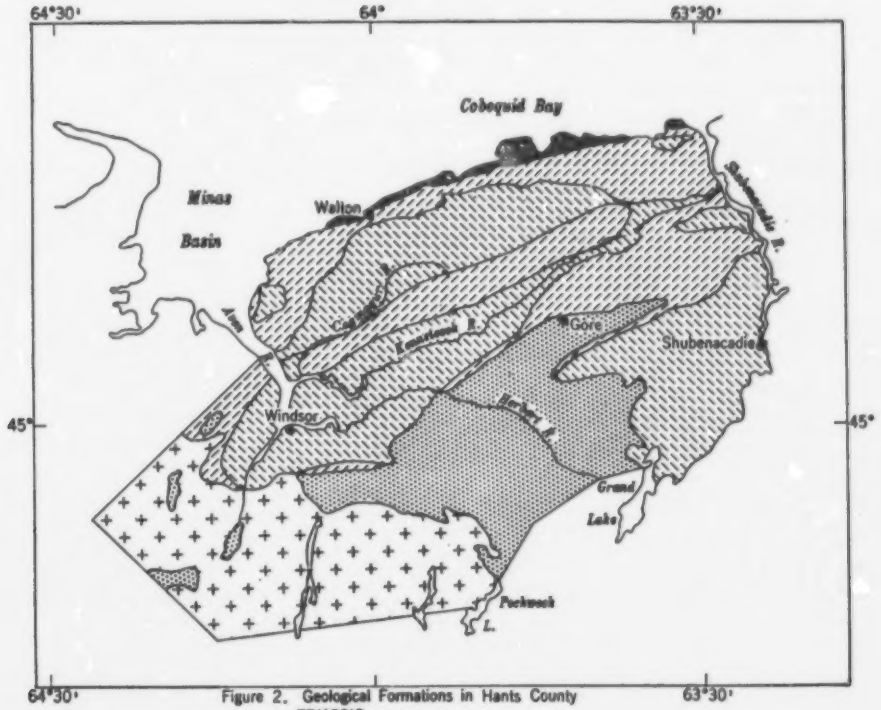


Figure 2. Geological Formations in Hants County

TRIASSIC
Sandstone

CARBONIFEROUS
Windsor
Limestone, gypsum, shale, sandstone

Horton
Sanstone, shale, conglomerate

Devonian
Granite

Precambrian
Quartzite, slate

The water-deposited materials on the lowland plain vary widely in their texture, composition, and relief. Along the larger rivers such as the Avon, Shubenacadie, and St. Croix large estuarine flats have been deposited. This material, brought down by the rivers and subsequently reworked by the tides, varies in texture from a fine sandy loam to a silty clay loam and is reddish-brown in color when well drained. Above the reach of the tidal waters and along the stream valleys of the interior, sandy alluvial deposits are found. These consist of more recently deposited alluvium and are often underlain at a depth of three to six feet by gravel. Glacial outwash deposits in the form of kames and eskers are found scattered throughout the county. These deposits are composed of coarser materials varying from sand to cobbles derived principally from the harder rocks of the upland. Usually they are roughly sorted or stratified.

On the upland plain the deposits of drift are not so deep as on the lowland, and in places the bedrock may be exposed. The Devonian granite rocks produce a till that is coarse textured, shallow and stony and soils developed from this are usually unsuitable for agricultural purposes. This also applies to areas where quartzite is the major component of the till. A few areas where the Pre-Cambrian slates occur are covered with a shallow, greyish-brown till of loam texture, which is usually quite firm and contains a considerable quantity of slate fragments. Soils developed from this material are usually suitable for cultivation except in places where the depth of the till is very shallow.

The alluvial deposits of this upland area are not of great importance. Small, coarse-textured gravelly deposits occur along some of the larger streams, but for the most part there are no deposits of agricultural value.

Relief and Drainage

As previously mentioned, two main physiographic divisions may be observed in Hants county. The lowland plain merges into the Annapolis-Cornwallis valley on the west and extends eastward across the northern part of the county and up the valley of the Shubenacadie river, continuing eastward

Figure 3—Relief typical of the Halifax soils. Stoniness is usually the limiting factor in use.

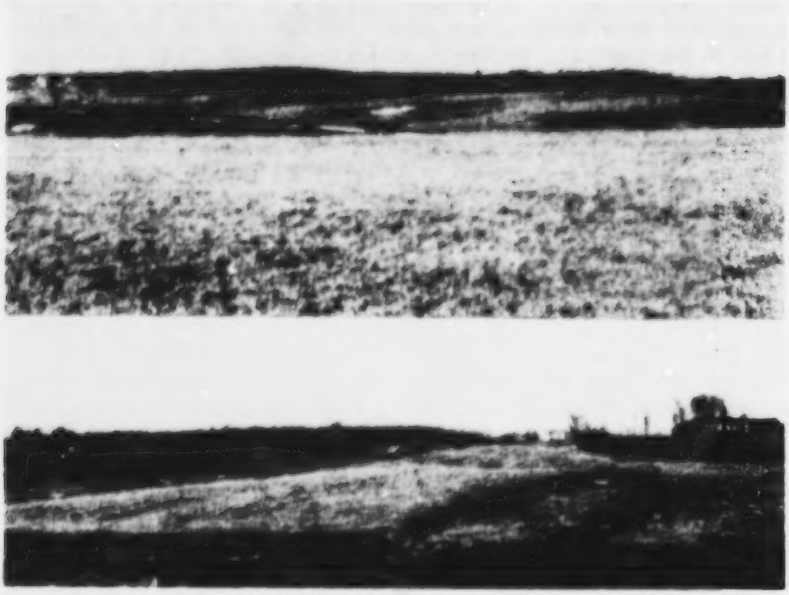


Figure 4—Upper: Tilted beds of the Windsor series on the Kennetcook river. The Queens and Falmouth soils are derived from these rocks. Lower: Topography of the Queens and Falmouth soils.

to Truro. The southern boundary of this plain forms tongue-like extensions into the upland plain. The underlying Triassic and Carboniferous rocks are faulted and folded in a complex manner, which is expressed topographically by a complex grouping of ridges and valleys. The ridges often assume an oval or drumlinoid shape but very few of them are true drumlins, since they generally follow the strike of the strata. In areas where gypsum underlies the surface, a peculiar type of topography appears. Due to the erosion and solution of the gypsum by underground waters, channels and caves are carved in the gypsum. The roofs of these caves often collapse producing a surface of funnel-shaped depressions or sinks and rounded irregular knolls scattered over the landscape. These areas occur chiefly in the vicinity of Windsor and, to a lesser extent, around Shubenacadie. The higher parts of the lowland plain have an elevation of about 300 feet but the general level varies from 100 to 250 feet above sea level. The greater part of the Windsor district is a low-lying surface with elevations below 200 feet. It is dissected by a number of shallow river valleys—the Avon, St. Croix, Kennetcook, and Cogmagun—whose lower courses have been submerged and have become tidal estuaries with bordering flat marshlands[1].

The upland plain occupies the southern part of the county with an extension northeasterly to Rawdon and Gore. South and west of Windsor the upland plain meets the lowland in a fairly well-defined escarpment which continues eastward

[1] Bell, W. A.—The Horton-Windsor District. Memoir 155, Geol. Survey of Canada, 1929.

to the vicinity of St. Croix, where it is obscured by the higher hills of the lowland plain. A good view of the lowland plain may be had from the hill at Gore on the northern edge of the upland plain. The elevation of the upland varies from 400 to 500 feet. The surface is undulating to rolling and is dissected by numerous stream lakes. Most of this area is non-agricultural land.

The Avon and Shubenacadie rivers form the main drainage channels of the county. Most of the rivers and streams rise in the upland plain and eventually find their way into one or other of these rivers. The St. Croix, Kennetcook, and Cogmagun rivers are principal tributaries of the Avon. All these rivers are fed by numerous branches. The St. Croix and Kennetcook receive the drainage from the upland plain, while the Cogmagun rises in a poorly drained area in the central lowland plain. On the eastern side of the county, the Nine Mile river and Five Mile brook drain into the Shubenacadie, which is the main drainage outlet of Grand lake. Along the northern shore of the county the Walton, Tennycape, and Noel rivers and several smaller brooks provide drainage for the northern slope of the lowland plain. On the upland plain numerous lakes and streams abound, offering fishing and recreational facilities as well as possible power sites. Many of these lakes are several miles in length. Surface drainage of Hants county is adequate to handle the annual precipitation, but the storage of water, runoff and percolation through the soil will depend largely on the nature of the drift, the vegetation, and the slope of individual areas.

Climate

Over broad areas the climate is a major factor in determining the types of soil development, the crops that may be grown and, to some extent, the occupation of the population. The climate of Hants county, in general with that of the province as a whole, is classed as humid temperate. The winters are long and cold and the summers are short and warm. The average annual precipitation is about 40 inches and the mean annual temperature about 44 degrees Fahrenheit. Local variations in precipitation and temperature occur throughout the year. Snow falls intermittently from the latter part of October until May, the heaviest falls taking place in January and February. Daily temperatures during the winter months have an average range of from 10 to 30 degrees. The danger of killing frosts is usually over by the latter part of May and the frost-free period extends to early September. Summer temperatures range from 50 to 75 degrees on the average, with occasional higher temperatures.

The average growing season ranges from 175 to 200 days and the frost-free period from 100 to 130 days, being shorter on the upland than on the lowland. The temperature and precipitation at selected stations in the area are given in the tables below. The data are compiled from reports prepared by the Meteorological Division, Department of Transport, Canada, and represent averages over a period of years.

The Windsor station is located on the lowland plain on the western side of the county and the Mt. Uniacke station in the southern upland. The Wolfville station is located a few miles to the west of the surveyed area. The temperatures recorded at Wolfville and Windsor are slightly higher than those at Mt. Uniacke during all seasons of the year. The precipitation, however, is considerably higher at Mt. Uniacke than at the other stations, particularly during the summer and fall months. At Mt. Uniacke about 36 per cent of the precipita-

tion falls during the growing season, compared with 37 per cent at Windsor and 36 per cent at Wolfville. A large proportion of the precipitation from November to May is lost as runoff.

The Thornthwaite classification [1] of climate offers a means of determining the effectiveness of the precipitation at various seasons of the year. It provides a means of determining water need, water surplus, and water deficiency based on climatic data. Under this system Hants county is described as a humid climatic type with a moisture index varying from 80 to 100. Table IV gives the precipitation and evaporation data as calculated by the Thornthwaite method for the selected stations and graphs prepared from this data are also shown below. It is interesting to note that both Windsor and Wolfville stations show an actual deficiency of moisture during the summer months, and at Mt. Uniacke moisture storage is reduced to a very low level. It might be pointed out that the Wolfville station shows the highest deficiency of any station in the province. Evaporation begins to exceed precipitation during the latter part of May or early June and from then until September, stored water is drawn upon to supply soil moisture.

TABLE II—TEMPERATURE RECORDED AT SELECTED STATIONS

Month	Wolfville (39 years)			Windsor (36 years)			Mt. Uniacke (19 years)		
	Daily Mean	Daily Max.	Daily Min.	Daily Mean	Daily Max.	Daily Min.	Daily Mean	Daily Max.	Daily Min.
December	21	34	20	26	33	20	25	34	16
January	22	31	14	22	30	14	20	30	9
February	21	29	13	20	28	13	18	28	7
Winter	23	31	15	22	27	15	21	31	10
March	30	38	22	30	37	22	28	37	19
April	40	48	32	40	48	32	37	46	27
May	50	60	40	50	60	40	48	59	36
Spring	44	48	31	40	48	31	37	47	27
June	59	69	49	59	70	49	56	69	43
July	66	76	56	66	76	56	62	74	50
August	64	74	55	65	75	55	62	75	50
Summer	63	73	53	63	73	53	60	72	47
September	58	67	48	58	68	48	59	66	42
October	49	57	40	48	57	40	45	56	34
November	38	45	31	38	44	31	36	45	27
Fall	48	56	39	48	56	39	45	55	34
Year	44	52	35	44	52	35	41	52	30

[1] Thornthwaite, C. W. An Approach Toward a Rational Classification of Climate. Geogr. Rev. 38: 55-94.

TABLE III—MEAN MONTHLY PRECIPITATION RECORDED AT SELECTED STATIONS

Month	Wolfville (39 years)		Windsor (36 years)		Mt. Uniacke (19 years)	
December	4·07	(19·7)[1]	3·93	(14·1)	4·16	(14·3)
January	4·08	(21·4)	3·84	(16·6)	4·32	(16·1)
February	3·23	(20·6)	3·26	(17·7)	3·45	(15·3)
Winter	11·38		11·03		11·93	
March	3·29	(14·1)	3·20	(11·5)	3·53	(10·6)
April	2·97	(5·1)	3·25	(5·0)	3·71	(2·9)
May	2·45		2·80	(0·2)	2·97	(0·4)
Spring	8·71		9·25		10·21	
June	2·68		2·85		3·16	
July	2·79		2·99		3·22	
August	3·16		3·10		3·67	
Summer	8·63		8·94		10·05	
September	3·18		3·01		3·69	
October	4·03	(0·2)	3·91	(0·3)	4·60	(0·2)
November	3·88	(5·2)	4·05	(3·7)	4·08	(3·7)
Fall	11·09		10·97		12·37	
Year	39·81		40·19		44·56	
May—September	14·26		14·75		16·71	

[1] Inches of snowfall. Ten inches of snow equals one inch of rain.

TABLE IV—COMPARATIVE MOISTURE DATA FOR SELECTED STATIONS

	Wolfville												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Potential Evaporation	0	0	0	1·05	2·68	4·97	5·11	4·38	3·05	1·87	0·56	0	23·67
Precipitation	4·08	3·23	3·29	2·97	2·45	2·68	2·79	3·16	3·18	4·03	3·88	4·07	39·81
Storage Change	0	0	0	0	− ·23	−2·29	−1·48	−1·22	·13	2·16	1·71	0	
Storage	4	4	4	4	3·37	1·48	0	0	·13	2·29	4	4	
Water Deficiency	0	0	00	0	0	0	·84	1·22	0	0	0	0	2·06
Water Surplus	4·08	3·23	3·29	1·92	0	0	0	0	0	0	1·61	4·07	18·20

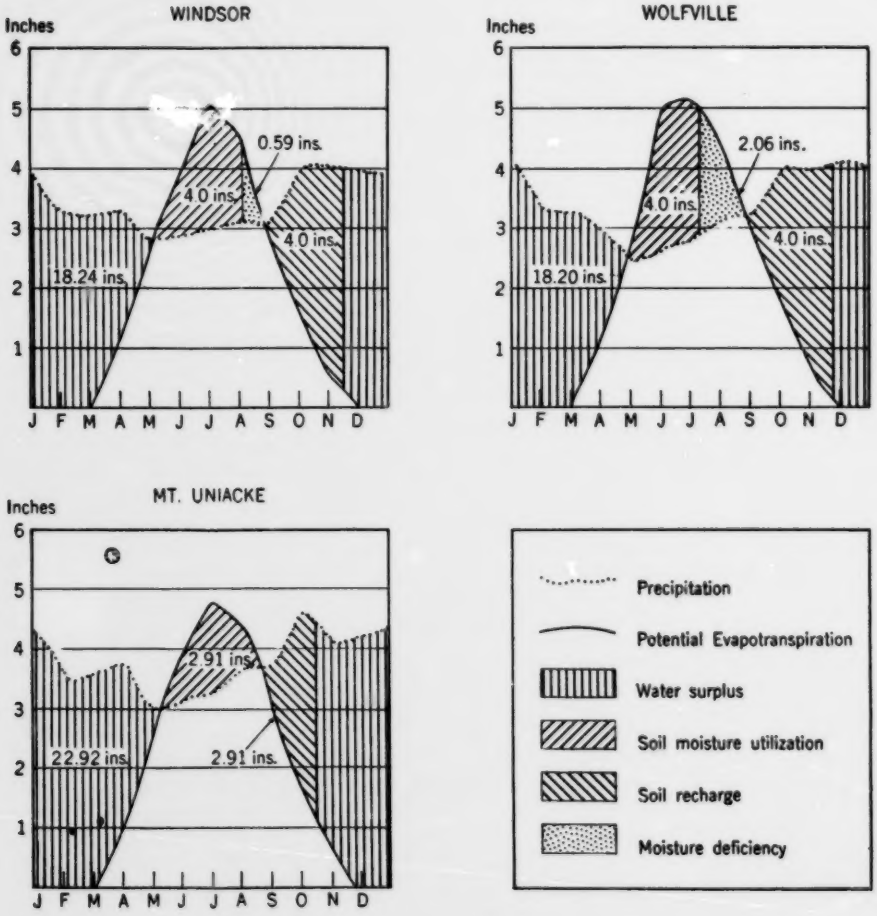
	Windsor												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Potential Evaporation	0	0	0	1·08	2·68	3·96	5·07	4·50	2·91	1·77	0·57	0	22·54
Precipitation	3·84	3·26	3·20	3·25	2·80	2·85	2·99	3·10	3·01	3·91	4·05	3·93	40·19
Storage Change	0	0	0	0	0	−1·11	−2·08	− ·81	·10	2·14	1·76	0	
Storage	4	4	4	4	4	2·89	·81	0	·10	2·24	4	4	
Water Deficiency	0	0	0	0	0	0	0	·59	0	0	0	0	0·59
Water Surplus	3·84	3·26	3·20	2·17	0·12	0	0	0	0	0	1·72	3·93	18·24

TABLE IV—COMPARATIVE MOISTURE DATA FOR SELECTED STATIONS—*Conc.*

	Mt. Uniacke												
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Potential Evaporation	0	0	0	0 88	2·71	3·[illegible]	4·75	4·36	2·90	1·68	0·57	0	21·64
Precipitation	4·32	3·45	3·53	3·71	2·97	3·16	3·22	3·67	3·69	4·60	4·08	4·16	44·56
Storage Change	0	0	0	0	0	— ·69	−1·53	— ·69	·79	2·12	0	0	
Storage	4	4	4	4	4	3·31	1·78	1·09	1·88	4	4	4	
Water Deficiency	0	0	0	0	0	0	0	0	0	0	0	0	
Water Surplus	4·32	3·45	3·53	2·83	0·26	0	0	0	0	·80	3·57	4·16	22·92

Figure 5

POTENTIAL EVAPOTRANSPIRATION AT SELECTED STATIONS



Vegetation

Hants county was originally covered with forest consisting principally of mixed hardwood and coniferous types of trees. In the early days of settlement the forested area along the shore of Minas Basin supplied the timber used in shipbuilding. There are very few pure stands of forest in the county, but the proportions of the various types of trees vary in certain areas. In the southern upland, where granite and quartzite are the chief source of soil materials, the area is well forested, with the exception of fire barrens southwest of Five Mile lake. Along the basin of the St. Croix lakes the forest consists of a large percentage of hemlock with some spruce, maple, and birch. Both eastward and westward to the limits of the granite area, red spruce is the dominant tree with smaller amounts of mixed hardwoods and softwoods.

Along the Minas Basin shore area hardwoods such as maples and birch are dominant on the ridges, while the depressional areas support a growth of mixed forest in which either red spruce or hemlock predominate[1]. In a few sandy areas, small stands of pine are found. On the lowland areas south and west of Shubenacadie mixed forest containing 50 to 75 per cent red spruce with some beech, maple, and birch is found. The boggy and swampy areas support a mixed black spruce-fir combination. Around Windsor, on the watersheds of the Avon, Kennetcook, St. Croix, and Cogmagun rivers, mixed spruce and fir are predominant on the ridges. At the present time upwards of 80 per cent of the county is covered with trees.

On the cleared areas throughout the county, a wide variety of grasses is found. In cultivated fields where hay is grown, timothy (*Phleum pratense*) is the principal grass with some clover and occasionally alfalfa. The principal grass found in pastures is brown top (*Agrostis tenuis*) together with small amounts of Kentucky blue grass (*Poa pratensis*), sweet vernal grass (*Anthoxanthum odoratum*), red fescue (*Festuca rubra*), couch grass (*Agropyron repens*) and orchard grass (*Dactylis glomerata*). On areas that have been pastured for many years or in dry sandy fields, poverty grass (*Danthonia spicata*) and panic grass (*Panicum spp.*) are common.

In the poorly drained places manna grass (*Glyceria canadensis*) is of common occurrence. The dykeland and salt marsh areas are covered with broadleaf (*Spartina spp.*), foxtail barley (*Hordeum jubatum*) and species of manna grass. In areas where gypsum is close to the surface, slender wedge grass (*Sphenopholis intermedia*) is found.

Age

The stage oi development of soils depends on the length of time that climate, vegetation, and other environmental factors have acted on the parent materials. In Hants county this dates from the recession of the ice sheet. This ice sheet mixed and redistributed the rock materials and altered the topography and drainage of the county. From observations of present-day ice sheets and from data gathered in the New England region by geologists, it is estimated that the ice sheet receded from Nova Scotia some 15,000 to 20,000 years ago. Since that time, the soil materials have been weathered, rivers have become firmly entrenched in their valleys, and in some places there has been a slight depression of the coastline resulting in submergence of the lower courses of the rivers.

[1] Fernow, B.E. Forest Conditions of Nova Scotia. Commission of Conservation, Canada, 1912.

Erosion

In Hants county soil erosion began with the clearing of the trees. At first soil erosion was not of great importance since clearing took place along the river courses, and the watersheds and slopes remained forested controlling the runoff. As these slopes were cleared, noticeable erosion began, particularly where the soil was composed of fine-textured materials. In this respect it is interesting to note that the soil materials along the slopes of the valleys of the larger rivers, such as the Avon and the Shubenacadie, are fine textured, and erosion will take place readily unless some means of preventing it is practised. The most common form of erosion is sheet erosion, but some hill and gully erosion occurs also. No data are available as to the extent of erosion and the fact that nearly 80 per cent of the improved land is in hay or grass crops fortunately has retarded any excessive erosion, particularly on the lowland areas. The nature of the soil here, however, makes it necessary to exercise care in the growing of hoed crops if erosion is to be kept at a minimum. On the upland areas, erosion is most prevalent on long or steep slopes from which the forest cover has been removed. Some of the steeper slopes have been gullied even under grass and these should be allowed to revert to forest.

CLASSIFICATION AND DESCRIPTION OF SOILS

Soil Development

The soils of Hants county are developed almost entirely from materials previously deposited by glacial action. The climate of the area favors the growth of forest vegetation and under the combined influence of climate and vegetation a type of development known as podzolization takes place.

The forest vegetation favors the accumulation of organic matter such as leaves, twigs, moss, and needles on the surface of the soil, rather than in the soil as is the case with grass vegetation. This organic material furnishes a medium for development of microbiological activity which breaks down the complex organic material into simpler compounds. The long winters in Hants county, when the ground is frozen and microbiological activity is at a minimum, favor the accumulation of organic matter on the surface. During the warmer months of the year this material, which is low in bases, is broken down and the resulting acid condition of the percolating water attacks the soil minerals. Bases are leached out and iron and aluminum compounds become soluble. These are washed farther down in the soil, where they reach less acid conditions and are precipitated. This leaching and precipitation process results in the formation of layers or horizons that vary in color, texture, and structure, and are designated as A, B, or C, depending on whether movement of material has been from the horizon or to the horizon. The unweathered parent material is designated as the C horizon. The soil that has maturely developed and has reached equilibrium with its environment under this process is called a podzol soil. Such soils are characterized by a greyish, heavily leached A_2 horizon under the surface with a darker colored horizon of deposition below it. The maturely developed podzol is known as the *zonal* soil, since it represents the type of development that takes place over a broad belt or zone where climatic conditions are similar.

In many cases, local conditions of drainage, relief or the nature of the parent material retard or restrict the podzolization process and the soils do not exhibit the profile characteristics of the zonal soils. Such soils are known as *intrazonal soils*. After the recession of the ice sheet, materials such as the

alluvium found along present stream valleys continued to be deposited. These materials have not developed profile characteristics, but merely show layering due to method of deposition. Such immature materials are classed as *azonal soils.* In Hants county soil development does not take place much below a depth of 30 inches and the majority of soil profiles rest on the unweathered parent material at a depth varying from 15 to 22 inches.

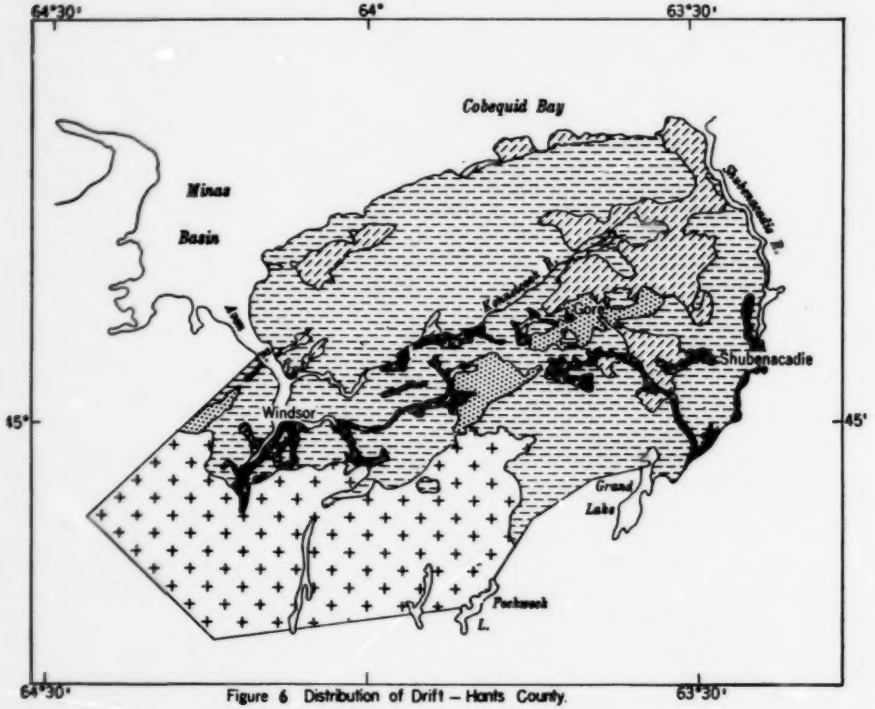


Figure 6 Distribution of Drift – Hants County.

Reddish brown clay loam till

Reddish brown sandy loam till

Grayish brown shaly loam till

Grayish brown sandy loam till

Water deposited materials

A normal, mature profile of a podzol soil under forest cover in Hants county is represented by the Pugwash soil described below.

Horizon	*Depth*	*Description*
A_0	0- 2 inches	—leaf litter, semi-decomposed organic matter; felty; fibrous.
A_2	2- 6 inches	—pinkish-white sandy loam; fine platy structure; loose and porous; pH 3·8

B_1 6-13 inches — yellowish-red sandy loam; structureless; loose and porous; some roots and fragments of sandstone; pH 5·0

B_2 13-19 inches — red sandy loam; medium nuciform structure; friable; some roots and sandstone fragments; pH 5·2

C below 19 inches — dark red sandy loam till; coarse nuciform structure; firm; contains numerous fragments and cobbles of grey and brown sandstone; pH 5·4

This represents one of the lighter-textured soils developed from till on the lowland plain. The soils of the upland plain are usually shallower and have yellowish-brown B horizons. In the soils of the lowland plain, the color of the parent rock material is often imparted to the profile.

The soils of the lowland plain developed from till are derived chiefly from sedimentary rocks of the Carboniferous age. Variations in color, texture, and lithology of these rocks have resulted in a variety of colors and textures in the till. Soils of the Queens, Elmsdale, and Hantsport catenas are developed from a reddish-brown clay loam till derived mainly from shales, but containing mixtures of shale, slate, and sandstone in proportions that affect profile characteristics and make separation possible.

The grey, red, and brown sandstones produce a sandy loam till from which the Pugwash, Truro, and Hansford soils are developed. Differences in the type of sandstone and the nature of profile development differentiate these soils. On the upland plain the till is derived principally from metamorphic and igneous material such as slates, quartzite, and granite. The Rawdon soils are developed from slates, the Halifax soils from slate and quartzite and the Gibraltar soils from granite. The till of the Halifax and Gibraltar soils is shallow, coarse textured, and stony. All of these soils have a leached layer under forest cover and are acid throughout their profiles. In the depressions and poorly drained areas the surface contains more organic matter and is often mucky in appearance. The profile is mottled and has a high water table. Poorly drained soils may have a glei horizon.

The soils developed from water-deposited materials have a varied origin. The Hebert, Torbrook, and Cornwallis soils have well-developed podzol profiles. Hebert soils are derived mainly from igneous materials and Torbrook and Cornwallis soils from a mixture of sedimentary and igneous materials. They are heavily leached and usually excessively drained.

Along the river courses and estuaries are the alluvial deposits from which the Stewiacke, Cumberland, and Acadia soils are developed. These soils are immature and show no horizon differentiation. Cumberland soils are coarse textured and of quite recent origin. Stewiacke soils are medium to fine textured and derived from sediments washed from the Carboniferous till of the higher elevations. Acadia soils are developed from material similar to that of the Stewiacke soils, which has been worked and redeposited by the tides. Throughout the county there are many depressions in which the water table is high and the soil is permanently saturated throughout the year. These areas are usually covered with moss, sedges, or stunted black spruce and are designated as swamp.

Soil Survey Methods

The purpose of a soil survey is to map, describe, and classify the soils of an area. Before detailed mapping of the area was begun, a broad reconnaissance was made to determine what types of soil existed in the area and their general characteristics. This enabled the surveyors to draw up a mapping scheme and legend. The survey of Hants county was of the detailed recon-

naissance type. All roads and trails were traversed by car and an examination of the different soils was made in many locations. Test pits were dug and road cuts and exposures were examined. In places where scarcity of roads or the presence of forest made tracts inaccessible by car, foot traverses were made. Frequent notes on the relief, drainage, and general characteristics of the soils and the crops grown on them were made and detailed descriptions of the type profiles were taken. The location of soil boundaries was ascertained by measurement on the car speedometer or by pacing. Soil boundaries were plotted on base maps supplied by the Department of Mines and Technical Surveys on a scale of one inch to one mile. The accuracy of these lines is coincident with the scale of the map.

The boundary between two soil areas is rarely sharply defined but is of a transitional nature, and the line must be drawn with some regard to the agricultural significance of the soil.

On the completion of mapping, representative profiles of the various soils were taken for analysis. These profiles were selected from undisturbed forest locations, so as to gain some knowledge of the potential value of the soil. A detailed description of these soils is given in this report.

Soil Classification

The unit used in mapping the soils of Hants county was the soil catena. In this unit, all soils developed on similar parent materials are grouped together. In some cases the parent materials of different soil catenas may be the same in color and texture, but have a different lithological origin, which is reflected in different profile characteristics.

Within each catena variations in drainage may produce mappable characteristics in the profile by which the soils may be separated into sub-groups or series. Thus a given catena may contain a well-drained, an imperfectly drained and a poorly drained series, all developed from similar parent material, but having differences in profile development due to drainage. Where possible these series were mapped out. Soil units are usually given a geographic name referring to the location at which the soil unit was first mapped. Often the catena name is also that of the dominant series within the catena, e.g. Queens catena contains Falmouth, Queens, and an unnamed series. In naming individual soils the surface soil texture or soil class name is added to the series name, e.g. Queens clay loam. Often in this type of survey series units are not named but merely designated as phytomorphic (P) (well drained); phytohydromorphic (PH) (imperfectly drained); or hydromorphic (H) (poorly drained) series.

Soil Key

The soil catenas mapped in Hants county have been grouped into two broad groups—those developed from glacial till and those developed from water-deposited materials. Further subdivisions were based on the texture and color of the parent material and again on the nature of the profile that developed on these materials. In Hants county the till derived from Carboniferous rocks has a red to reddish-brown color regardless of texture and soil profiles developed on this material have yellowish-red to reddish-brown B horizons. The soils developed on the upland from metamorphic or igneous materials have a greyish-brown till and yellowish-brown or strong brown B horizons.

In the table below a key to the soils of Hants county is presented and the lithology of the parent materials is noted for each catena.

TABLE V

A Key to the Soils of Hants County

PODZOL ZONE

A. *Soils Developed from Till*

1. *Clay loam parent materials.*

(a) Reddish-brown clay loam till derived from reddish-brown shale and mudstone.

Queens Catena

(b) Reddish-brown clay loam till derived from reddish-brown and grey shales.

Hantsport Catena

(c) Reddish-brown clay loam till derived from a mixture of Queens parent material with slate, quartzite, and granite.

Elmsdale Catena

2. *Sandy loam to loam parent materials.*

(a) Dark red sandy loam till derived from Triassic sandstone.

Truro Catena

(b) Reddish-brown sandy loam till derived from reddish-brown, fine-grained sandstone.

Pugwash Catena

(c) Reddish-brown sandy loam till derived from a mixture of brown and grey coarse-textured sandstone.

Hansford Catena

(d) Greyish-brown shaly loam till derived from grey slate and shale.

Rawdon Catena

(e) Pale brown to light olive sandy loam till derived from quartzite and some slate.

Halifax Catena

(f) Greyish-brown sandy loam till derived from granite.

B. *Soils developed from water-deposited materials*

1. *Soils developed from gravelly sandy loam deposits.*

Gibraltar Catena

(a) Yellowish-brown gravelly sandy loam material derived from granite and metamorphic rocks.

Hebert Catena

(b) Yellowish-brown gravelly sandy loam material derived chiefly from sedimentary rocks.

Torbrook Catena

(c) Yellowish-red sand of mixed origin.

Cornwallis Catena

2. *Silt loam to silty clay loam deposits along river courses.*

(a) Reddish-brown silt loam deposits.

Stewiacke Catena

(b) Reddish-brown silty clay loam deposits in estuaries reworked by tidal waters.

Acadia Catena

3. *Sandy loam deposits along river courses.*

(a) Reddish-brown sandy loam material—recent alluvium.

Cumberland Catena

C. *Miscellaneous Soils*

Peat

Swamp

Discussion of Soils

A. SOILS DEVELOPED FROM TILL.

The major proportion of the soils of Hants county are developed from glacial till. These soils occupy an area of 716,684·80 acres or approximately 1,120 square miles. This represents about 91 per cent of the area of the county and includes about 20 square miles mapped as swampy land. The Carboniferous rocks of the lowland plain have resulted in a till that has generally a reddish-brown color and varies in texture depending on the nature of the parent rock. Where the shales predominate the texture is a clay loam, sandstones give rise to a sandy loam till, and mixtures of these rocks produce a till of intermediate texture. On the upland plain the harder quartzite and

TABLE VI—SOIL ACREAGES IN HANTS COUNTY

Catena	Square Miles	Acres	Percentage of Total
Queens P	123·46	79,014·14	10·04
PH	168·39	107,769·60	13·71
H	82·80	52,992·00	6·62
Hansport P	60·54	34,745·60	4·93
PH	28·91	18,502·40	2·36
H	5·44	3,481·60	0·44
Elmsdale P	98·11	62,790·40	7·99
PH	14·64	9,369·60	1·19
H	·60	384·00	·04
Pugwash P	23·67	15,148·80	1·93
Truro P	9·77	6,252·80	0·79
Hansford P	88·56	56·678·40	7·21
H	7·74	4,953·60	0·63
Rawdon P	56·47	36,140·80	4·59
H	2·32	1,484·80	0·19
Halifax P	68·85	44,064·00	5·60
H	0·71	454·40	0·06
Gibraltar P	268·25	171,680·00	21·83
Hebert P	13·50	8,640·00	1·10
Torbrook P	4·64	2,969·60	0·38
Cornwallis P	0·75	480·00	0·06
Cumberland P	9·17	5,868·80	0·75
H	1·49	953·60	0·12
Stewiacke P	10·40	6,656·00	0·85
H	3·77	2,412·80	0·30
Acadia PH	7·34	4,697·60	0·59
H	3·94	2,521·60	0·32
Peat	9·10	5,824·00	0·75
Swamp	13·49	8,633·60	1·09
Lakes and Rivers	42·18	26,995·20	3·43
Total	1,229·00	786,560·00	100·00

P—well-drained series
PH—imperfectly drained series.
H—poorly drained series

granite rocks have resulted in a till that has generally a greyish-brown color and a sandy loam texture. Under forest cover all of the soils develop a greyish leached layer under the surface common to podzol soils. Throughout the county the soils develop B horizons that can generally be described as either reddish-brown or yellowish-brown depending on the lithological nature of the parent material. On the lowland plain, the soils of the Queens, Elmsdale, and Hantsport catenas are developed from fine-textured till, while those of the Pugwash, Truro, and Hansford catenas are developed from coarse-textured till. The upland soils of the Rawdon, Halifax, and Gibraltar catenas are developed from coarse-textured till whose lithological character largely determines the suitability of the soils for agricultural purposes. The approximate acreage of the different soils in the county is given in Table VI.

Soils Developed from Clay Loam Parent Material.

Queens Catena.

The soils of the Queens catena occupy the largest area (about 50 per cent) of soils on the lowland plain. They occur in the vicinity of Windsor and along the Shubenacadie valley and occupy a large area in the central part of the county. The total area covered by these soils is 239,776 acres or about 30 per cent of the county. About 32 per cent of this area is well drained, about 42 per cent is imperfectly drained and the remainder is poorly drained.

The Queens soils are developed from a reddish-brown clay loam till derived principally from red shales and mudstone. The till contains fragments and stones of red and brown sandstone in varying proportions, depending on the nature of the underlying rock over which the till has been deposited. The topography of the Queens soils varies from undulating to strongly rolling. Around Windsor and areas where the till has been deposited over gypsum, the relief has a mounded appearance, varying from gentle swells to the karst topography typical of gypsum and limestone areas. The fine texture of the subsoil prevents rapid internal drainage and consequently a large proportion of the Queens soils are imperfectly to poorly drained, but where the till has been deposited over gypsum, the soils appear to have better drainage and this is reflected in profile characteristics. On long slopes drainage may be good at the top of the slope, but seepage spots may occur farther down the slope due to water running along the tight substratum. Soils of the Queens catena contain variable amounts of stone, but these are seldom of such a nature as to interfere with cultivation. With the exception of the district around Windsor and Shubenacadie, a large part of the Queens soils is covered with forest consisting of spruce, fir, hemlock, poplar, and birch trees.

The well-drained soils of the Queens catena are represented by the Falmouth series. This series occurs principally in the Windsor district where the till has been mixed with, and deposited over gypsum. Under forest vegetation the Falmouth soils have a thin surface layer of semi-decomposed leaf litter and debris, under which is a one-inch layer of fairly well-decomposed organic matter mixed with mineral material. This layer is dark grey to black and has a medium nuciform structure, being held together by numerous roots. These surface layers are underlain by a pinkish-grey sandy loam A_2 horizon that varies in depth from a trace to about two inches. The B_1 horizon, which is three to five inches below the surface is a yellowish-red sandy loam or loam with a fine nuciform structure. It is firm, but friable when crushed and contains fragments of sandstone. Roots are also found in this horizon. This grades into the B_2 horizon at a depth of 10 to 15 inches. The B_2 horizon is reddish-brown and has a clay loam texture, exhibiting a well-developed blocky structure and is usually quite firm in place. The clay loam parent material,

which occurs below a depth of 20 to 22 inches also has a coarse blocky structure and is dark reddish-brown in color. It is firm and contains numerous sandstone fragments, although in some places it is nearly free of stone. Streaks of black carbonaceous material run through it and small particles of gypsum are found in it. The till often rests on the gypsum bedrock at a depth of 8 to 15 feet below the surface.

A detailed description of a representative profile of a Falmouth soil is given below:

Horizon	*Depth*	*Description*
A_0	0 - ½ inches	— leaves, needles, semi-decomposed organic matter; numerous roots.
A_1	½- 2½ inches	— dark grey (10 YR 4/1)* sandy loam; medium nuciform structure; loose; porous; numerous roots; pH 5·0
A_2	2½- 3 inches	— pink (5 YR 7/3) sandy loam; weak platy structure; moderately cohesive; friable; numerous roots; variable in depth; pH 5·2
B_1	2½-14 inches	— yellowish-red (5 YR 5/6) sandy loam; fine nuciform structure; friable; firm in place; small fragments of sandstone and slate; some roots; pH 5·2
B_2	14 -23 inches	— reddish-brown (2·5 YR 4/4) clay loam; coarse blocky structure; firm; few roots; some sandstone fragments pH 5·5
C	below 23 inches	— dark reddish-brown (2·5 YR 3/4) clay loam; weakly developed coarse blocky structure; firm; pervious carbonaceous streaks; slightly micaceous; pH 6·0

*Colors are defined by a numerical system that refers to a book of standard colors issued by the United States Department of Agriculture, Soil Survey Division.

In the area around Newport Landing and from Burlington to Cheverie, the Falmouth soils are somewhat sandier in the upper horizons and appear to have been waterworked at some time in their history. Around Windsor Forks and Upper Falmouth these soils are quite free from stone and are somewhat heavier in texture throughout the profile. Smaller areas of Falmouth soils are scattered throughout the county. These have sometimes been included with the Queens series where the areas were too small to map.

The imperfectly drained soils of the Queens catena are represented by the Queens series. These soils are the dominant and most widespread of the Queens catena. They occur over large areas in many counties of the province. In Hants county, the Queens series occupies 13·7 per cent of the whole county. The largest areas occur in the central part of the county north of the Windsor-Truro railway line and along the Shubenacadie valley. Smaller areas are scattered throughout the county. The Queens series occupy long sloped or rolling topography and the profile is imperfectly drained. Water moves over and through the soil very slowly and will stand for some time on the more level areas. A large proportion of the Queens series in Hants county is forested. Under these conditions, a fairly deep surface layer, consisting of semi-decomposed organic matter which is fibrous and full of roots, is developed. The A_2 or leached horizon, which occurs at a depth of three to five inches below the surface, is much thicker than in the well-drained Falmouth series. It is a three- to six-inch layer of pinkish-grey loam or sandy loam having a medium platy structure and containing roots and fragments of sandstone. This rests on the reddish-brown clay loam B_1 horizon which has a fine nuciform or

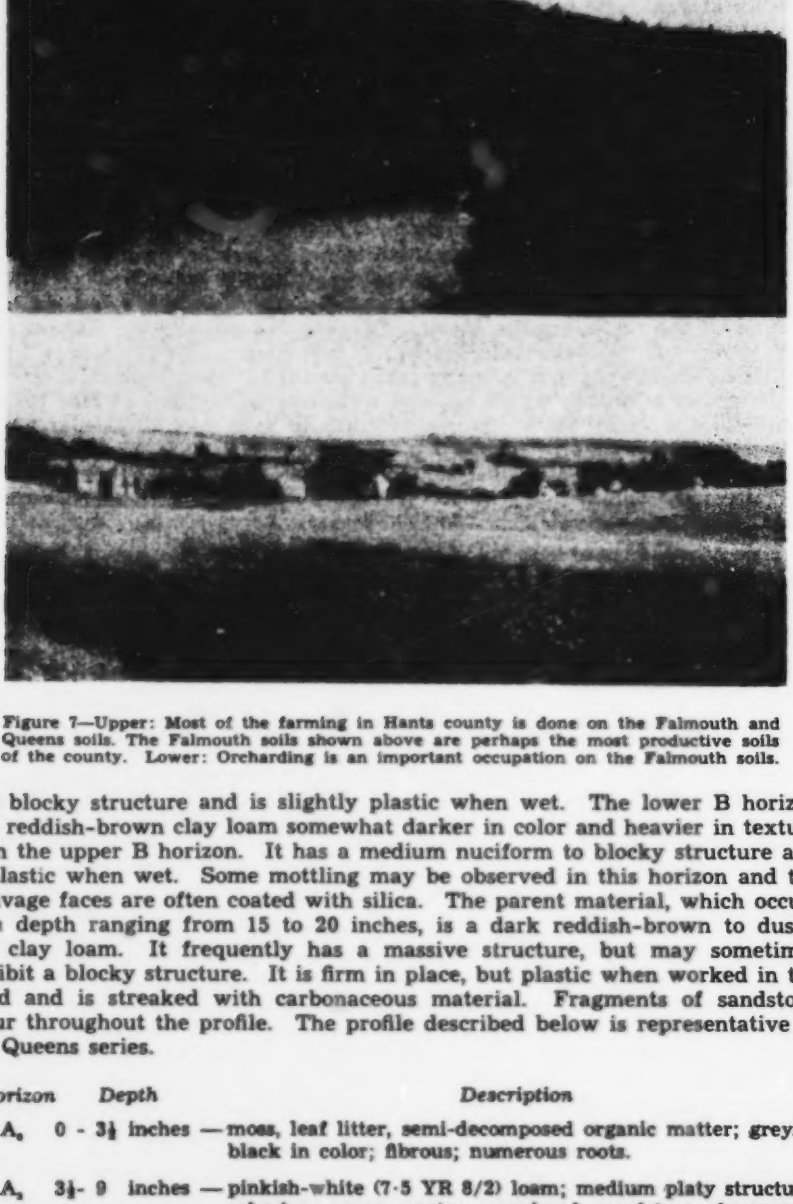


Figure 7—Upper: Most of the farming in Hants county is done on the Falmouth and Queens soils. The Falmouth soils shown above are perhaps the most productive soils of the county. Lower: Orcharding is an important occupation on the Falmouth soils.

fine blocky structure and is slightly plastic when wet. The lower B horizon is a reddish-brown clay loam somewhat darker in color and heavier in texture than the upper B horizon. It has a medium nuciform to blocky structure and is plastic when wet. Some mottling may be observed in this horizon and the cleavage faces are often coated with silica. The parent material, which occurs at a depth ranging from 15 to 20 inches, is a dark reddish-brown to dusky red clay loam. It frequently has a massive structure, but may sometimes exhibit a blocky structure. It is firm in place, but plastic when worked in the hand and is streaked with carbonaceous material. Fragments of sandstone occur throughout the profile. The profile described below is representative of the Queens series.

Horizon	*Depth*	*Description*
A_0	0 - 3½ inches	— moss, leaf litter, semi-decomposed organic matter; greyish black in color; fibrous; numerous roots.
A_2	3½- 9 inches	— pinkish-white (7·5 YR 8/2) loam; medium platy structure; cohesive; some roots; occasional sandstone fragments; pH 4·3

B_1 9 -13 inches — reddish-brown (5 YR 5/4) clay loam; fine nuciform structure; firm; slightly plastic; few stones; occasional roots; pH 4·5

B_2 13 -17 inches — reddish-brown (5 YR 4/3) clay loam; medium nuciform structure; firm; plastic; fragments of grey sandstone; some mottling; pH 5·0

C below 17 inches — dusky red (2·5 YR 3/2) clay loam; massive, breaks to medium blocky structure; plastic; mottled; contains numerous fragments of sandstone and carbonaceous material; firm to compact when dry; pH 5·4

In many profiles mottling may occur in the B_1 horizon. Variations in the profile occur in different parts of the area. In the vicinity of Admiral Rock, the Queens soils are fairly well drained and underlain by limestone. Around Shubenacadie, the Queens soils occur on smooth drumlinoid hills and the till is somewhat lighter in texture, containing sandy patches and the C horizon is quite mottled. North of Enfield, the soils have a well-developed crumb structure in the B horizon. North of Elmsdale the till is heavy but the upper horizons of the soil are quite sandy. The whole area between Enfield, Nine Mile River and Shubenacadie, north of the main highway, has a gently undulating topography and in many cases the till has been somewhat modified by the action of water, which appears to have modified the surface textures of the Queens soils. Many small gravel knolls, sand spot areas and heavier ponded deposits occur throughout this area. Some of the Queens soils between Upper Kennetcook and Hennigar contain considerable flaggy sandstone and the B horizon has a yellowish-red color. Along the road from Walton to Cogmagun River, sandier variations occur in the Queens soils.

The poorly drained member of the Queens catena was mapped out wherever areas of sufficient size occurred. These soils form an unnamed series and occupy about 82 square miles scattered throughout the county. The largest single area occurs north of Mosherville, Stanley, and Clarksville, east of the Walton-Cogmagun River road. These soils have a thick layer of poorly decomposed organic matter on the surface. The A_2 horizon is usually quite thick, pinkish grey in color and has a sandy loam texture. The B_1 horizon is a light reddish-brown sandy clay loam to clay loam, usually quite firm and heavily mottled with grey and yellow streaks. It is usually thin and grades into a dark reddish-brown clay loam B_2 horizon which is also mottled. The parent material is generally found at a depth of 12 to 15 inches, has a massive structure, is highly mottled, and quite impervious. These soils remain wet for a large part of the year.

Utilization of soils

The utilization of the soils of the Queens catena is largely dependent on drainage conditions. The soils of the Falmouth series, therefore, are most naturally suitable for agricultural purposes. Practically all of the Falmouth soils in the area are under cultivation, except some small areas west of Falmouth and around Newport Landing. The principal crops grown are hay, oats, potatoes, corn, roots, and apples. Several large orchards are planted on this soil and appear to be very productive, especially on the finer-textured areas around Falmouth and Upper Falmouth. Yields of 150 barrels per acre are reported. The finer-textured soils are fairly well supplied with organic matter, but the coarser-textured areas, such as around Burlington, are low in fertility and require organic matter and fertilizer to increase their productivity. Lime is necessary for successful clover production. In general, crops on the Falmouth soils are somewhat better than on the Queens soils.

The Falmouth soils are subject to water erosion and care should be taken in cultivating slopes over three per cent. On some slopes in the area, the A horizon has almost entirely disappeared and this may partly account for the low yields obtained in some sections.

The major problem connected with the Queens series of soils is drainage. The heavy texture of the soil requires that it be worked when moisture conditions are right. Attention to this detail is often more important than fertility requirements. The installation of tile drains in this soil requires that they be spaced fairly closely and this makes the operation quite costly. Shallow ditches plowed in the fields and dead furrows provide drainage for surface waters. Often the tops of slopes are fairly well drained, while water collects at the base of the slope. The natural fertility of the Queens soils is not high. The supply of phosphorus and potash is low. In Hants county, no large areas of Queens soils are cultivated, the largest areas being along the Shubenacadie valley. Here also are many abandoned farms. The better areas of this soil are found in the vicinity of Admiral Rock and near Shubenacadie, where the soil is somewhat better drained and has a better structure than is usually the case. Hay and grain are the principal crops grown. Usually fields are left in hay for many years and yields become very low. The Queens soils, in common with many other soils of the area, will give good response to fertilization and management. Rotations of four to five years duration, the application of lime and building up of organic matter are required for best results. The Queens soils are best suited for hay and grain crops or permanent pasture. The fine texture and imperfect drainage of the soils renders them unsatisfactory for vegetable crops. Erosion on the Queens soils is not usually a serious factor except where clean cultivation is practised on the steeper slopes.

The poorly drained soils of the Queens catena are unsuitable for agricultural purposes. Generally these soils occupy depressional areas, where natural or artificial drainage is difficult and the forest vegetation is the most valuable and economical crop that could be grown on these soils.

Hantsport Catena

The soils of the Hantsport catena occur in a narrow band along the north shore of the county, east of Cheverie and Burlington and along the valley of the Halfway river west of Windsor. They occupy a total area of 60,729 acres or 7·7 per cent of the county. The Hantsport soils are developed from a fine-textured till derived principally from reddish-brown and grey shales of the Horton series. Along the north shore this till may have been influenced somewhat by the Triassic rocks to the north. The topography of these soils varies from moderately undulating to gently rolling in the Burlington-Pembroke area to hilly in the area south of Hantsport and up the Halfway river valley. Along the north shore, long slopes with gently undulating micro-relief are common. About 60 per cent of the soils of the Hantsport catena are well drained, the remainder being imperfectly to poorly drained. Surface drainage is generally good, but internal drainage may be impeded by the heavy nature of the subsoil.

There is very little surface stone on the Hantsport soils, but on the hilly topography the underlying shale may outcrop and the soil profile is fairly shallow. Shale fragments and occasional cobbles usually occur throughout the profile. Some shallow areas also occur on the gently rolling topography between Bramber and Pembroke.

Nearly all of the Hantsport soils are covered with forest consisting of spruce, fir, birch, poplar, and maple. On the higher ridges the hardwoods are dominant and the soils seem to be capable of producing a good forest stand. In the vicinity of Hantsport where formerly cleared areas are reverting to forest, birch, fir, tamarack, and alder are the prevailing cover.

The well-drained soils of the Hantsport catena have been mapped as the Wolfville series. These soils occur in a narrow band along the north shore of the county between Walton and Stirling Brook. They lie on the long slope south of the shore road. Small areas of the imperfectly drained Hantsport series too small to map are included in this area. Except for a few fields, most of the Wolfville soils are covered with trees. Under this type of vegetation the two- to three-inch surface layer consists of black, semi-decomposed leaf litter and organic material held together by numerous fibrous roots. This is underlain by a pinkish-white or light reddish-brown A_2 horizon of loam texture having a weakly developed platy structure. It often contains numerous shale fragments. The B_1 horizon, which occurs at a depth of six to eight inches, is a yellowish-red to reddish-brown clay loam with a fine nuciform or medium crumb structure. This grades into the B_2 horizon, becoming darker in color and heavier in texture with depth. The parent material generally occurs at a depth of 16 to 24 inches. It is a dusky red or weak-red clay loam till, often structureless or massive, but crushes in the hand to a nuciform structure. It contains shale fragments and occasional cobbles and slabs of shale together with some fragments of sandstone. Slight mottling may occur in the C horizon. Root development usually ceases in the upper part of the B_2 horizon. It is believed that some of the red color of the till is imparted from the Triassic rocks to the north and fragments of these may sometimes be found in the till. A detailed description of a Wolfville profile is given below.

Horizon	*Depth*	*Description*
A_0	0- 3 inches	— black, semi-decomposed organic matter; felty, fibrous; matted roots; occasional angular cobbles.
A_2	3- 8 inches	— light reddish-brown (5 YR 6/2) loam; slightly firm; structureless; shale fragments; good root distribution; pH 4·5
B_1	8-15 inches	— reddish-brown (2·5 YR 4/4) loam; medium crumb structure; slightly plastic; shale fragments; numerous roots.
B_2	15-22 inches	— reddish-brown (5 YR 4/4) clay loam; medium nuciform structure; firm; slightly plastic; numerous shale fragments.
C	below 22 inches	— weak-red (10 R 4/4) clay loam; massive; somewhat laminated; plastic; shale fragments and occasional cobbles; slightly mottled; pH 5·5

The till is redder nearer the shore than farther south. In some places the reddish-brown shale comes close to the surface and imparts a shaly nature to the whole profile.

The soils of the Hantsport series were mapped as the imperfectly drained member of the Hantsport catena. These soils occur largely east of Cheverie and Burlington and along the valley of the Halfway river. Hantsport soils, when cultivated, have a greyish-brown surface soil to plow depth, but under forest cover the two- to three-inch fibrous organic mat is underlain by a grey or pinkish-grey sandy loam A_2 horizon. This develops a platy structure and is usually quite friable. Fragments of sandstone and shale are present. The upper B horizon is a yellowish-brown loam to clay loam with a fine nuciform structure. It is usually friable and may show slight mottling. The lower

part of the B horizon is yellowish-brown or yellowish-red clay loam, which is quite firm and usually mottled with yellowish and reddish streaks. Shale fragments and occasional cobbles may be present. The C horizon which occurs at a depth ranging from 16 to 20 inches, is a dark reddish-brown clay loam. It is often structureless, but breaks to a coarse nuciform or blocky structure and is highly mottled. Angular shale fragments and cobbles are present. It is often stiff and plastic when wet and very firm when dry. Mottling in the profile is variable, depending to some extent on topography and the depth of the soil. In general, the Hantsport soils show more mottling in the vicinity of Summerville than in the area south of Hantsport. In many respects the Hantsport soils resemble the Joggins and Diligence soils mapped in Colchester and Cumberland counties. A description of a representative profile of a Hantsport soil taken near Bramber is given below:

Horizon	*Depth*	*Description*
A_0	0- 2 inches	— black semi-decomposed organic matter; loose; porous; fibrous; many roots.
A_2	2- 4 inches	— light grey (10 YR 7/2) sandy loam; medium platy structure; friable; slightly mottled; some roots; shale fragments; pH 4·6
B_1	4-10 inches	— yellowish-brown (10 YR 5/8) clay loam; fine nuciform structure; friable; mottled; numerous shale fragments.
B_2	10-19 inches	— yellowish-brown (10 YR 5/4) clay loam; fine nuciform structure; slightly firm; mottled; angular shale cobbles; slightly impervious;
C	below 19 inches	— dark reddish-brown (5 YR 3/4) clay loam; structureless; firm; plastic; mottled with grey and yellow streaks; shale fragments and angular cobbles; pH 5·8

In the deeper profiles and somewhat better drained areas, the upper B horizon may be reddish-brown in color and lack any mottling, but the B_2 and C horizons are always mottled. The poorly drained member of the Hantsport catena was mapped out, but no name has yet been allotted to this series. In these soils a thick layer of organic matter accumulates on the surface and the profile is usually shallow. Mottling occurs in all horizons and the parent material is quite impervious to the percolation of water. Most of these soils are unsuitable for agricultural purposes.

Utilization of soils

Only small areas of the Wolfville series of soils are under cultivation in Hants county and hay and grain are the principal crops. In some places where the surface soil is somewhat lighter in texture than usual and internal drainage is moderately rapid, potatoes are grown. The soils are generally suitable for hay, grain or pasture and they respond well to good management. Hay and grain crops on these soils appear to give as good yields as those on Falmouth soils when proper management is practised. The soils are acid and require liming, as well as added organic matter, to improve the tilth of the soil. On the longer and steeper slopes care must be exercised where hoed crops are grown, to prevent washing of the soil down the slope. The Wolfville soils seem to be quite susceptible to erosion under clean cultivation. The soils of the Hantsport series are not cultivated to any great extent in Hants county. The better developed areas occur around Hantsport town and on these areas hay and grain are the chief crops grown. The soils, because of their slowness in draining, are not well suited to field crops but seem to be well suited to the production

of hay. On slopes where surface runoff is moderately rapid and in favorable seasons, the Hantsport soils may be suitable for roots or potatoes, but here again care must be taken to prevent soil erosion. In general, hay and permanent pasture are the best agricultural uses for the Hantsport soils. The productive capacity of these soils can be increased by the use of lime and fertilizers and the maintenance of organic matter through applications of manure or plowing under green manuring crops.

The poorly drained soils of the Hantsport catena are not used for agricultural purposes and are better left in forest.

Elmsdale Catena

The soils of the Elmsdale catena occur in the southeastern part of Hants county on the upland plain. They occupy an area of 72,544 acres or slightly more than nine per cent of the county. The Elmsdale soils are derived from a reddish-brown clay loam till, somewhat similar to that of the Hantsport catena, which has been mixed with the slate and quartzite of the upland plain. The Elmsdale soils occupy rolling to hilly topography and are sometimes found on long slopes. The nature of the relief ensures good surface drainage and in most cases, the movement of water through the soil is moderately rapid. On the longer slopes internal drainage seems to be slower and the soil is moist and may be considered imperfectly drained. About 90 per cent of the Elmsdale soils in Hants county are considered to be well drained and only a very small area is poorly drained.

The stone content of these soils is variable. In the vicinity of Rawdon the soils contain considerable slate and shale, but not enough stone to interfere with cultivation. Farther south in the area between Long lake and Grand lake, the till has been mixed with the quartzite, and quartzite stones and boulders are common both on the surface and in the profile. This content of stone is partly responsible for the better drainage on these fine-textured soils, since they tend to open up the fine till and provide drainage channels for the percolating water. Similarly the disintegration of the quartzite tends to lighten the texture and increase the pore space of the soils.

Only small areas of the Elmsdale soils are cleared and large areas are covered with forest. Vegetation consists principally of spruce, maple, and birch. The hardwoods predominate on the ridges and the more poorly drained places support a growth of red maple, black spruce and tamarack.

The members of the Elmsdale catena have been mapped out, but the various series have not been named and are merely designated as the well-drained, imperfectly drained, or poorly drained series.

Under forest vegetation the well-drained soils of the Elmsdale catena develop a two- to three-inch layer of organic matter on the surface. This is composed of a thin layer of needles, moss, and leaves which rests on a layer of black semi-decomposed material held together with tightly matted roots. The whole layer is loose and fluffy and very acid. The A_2 horizon is a pinkish-grey fine sandy loam with a fine platy structure. It contains shale fragments and is penetrated by numerous roots. The B_1 horizon, which occurs at a depth of five to seven inches from the surface, is a yellowish-red loam. It usually has a fine to medium nuciform structure and is quite friable. Tree roots penetrate this horizon, and shale and slate fragments are present. This grades gradually into the yellowish-red to light reddish-brown B_2 horizon, which is quite similar in structure and consistency to the horizon above. It is quite firm in place, but friable when removed. Roots are found in this horizon and also angular pieces of slate and occasional sandstone and quartzite fragments. The C horizon occurs at a depth of 16 to 20 inches and is a reddish-brown clay

loam with a medium nuciform structure. It is firm and contains cobbles and fragments of slate and shale. The C horizon may sometimes show a slight mottling. In the areas where the till is deposited over quartzite, the quartzite boulders seem to be confined to the surface and only occasionally are they present in the profile. Here also the quartzite outcrops in places and the boulders may have been derived from these exposures. A detailed description of a well-drained profile of the Elmsdale catena is given below:

Horizon	*Depth*	*Description*
A_0	0- 3 inches	— black, semi-decomposed organic matter; F layer thin; H layer tightly matted roots and very fibrous; loose, dry and fluffy; pH 4·0
A_2	3- 5 inches	— pinkish-grey (7·5 YR 7/2) fine sandy loam; very thin platy structure; friable; slightly firm; numerous roots; shale fragments.
B_1	5-11 inches	— yellowish-red (5 YR 4/8) loam; fine nuciform structure; friable; numerous roots and shale fragments; pH 4·6
B_2	11-21 inches	— yellowish-red (5 YR 4/6) loam; fine to medium nuciform structure; friable; slightly firm in place; some roots; angular shale fragments.
C	below 21 inches	— reddish-brown (2·5 YR 4/4) clay loam; medium nuciform structure; moderately firm; slightly mottled; shale fragments and occasional cobbles; pH 4·8

In many profiles the B_2 horizon is reddish brown, especially where the profile is shallower than the one described above.

The imperfectly drained series of the Elmsdale catena occurs chiefly in the area north of the Rawdon gold mines and between there and Upper Rawdon. In these soils the A_2 is deeper than on the well-drained series and is a greyish color. The B horizon is a pale brown sandy clay loam grading into a reddish-brown clay loam C horizon. Both the B and C horizons show mottling, and there is considerable shale and slate throughout the profile. In some places the profile contains considerable stone. Where the Elmsdale soils come into contact with the Rawdon soils the till is more shaly and the topography smoother than usual.

The poorly drained areas of Elmsdale soils are generally wet for a considerable portion of the year. Most of these areas are located in depressions where surface waters cannot drain away rapidly and the surface becomes mucky in appearance. These areas are not suitable for agricultural purposes, but support a fair tree growth.

Utilization of soils

Only small areas of the Elmsdale soils are under cultivation at present. The principal cleared areas are in the vicinity of Upper Rawdon, Rawdon Gold Mines and south of Upper Newport. Both the well-drained and imperfectly drained series are under cultivation. Where the soils do not contain much stone they seem to be well suited for agricultural purposes. Hay and grain are the chief crops grown and, in general, these soils have about the same crop value as the soils of the Hantsport catena. In 1948 the hay crop on these soils was equal to any in the county and it is probable that they will produce a better crop in dry years than some of the other soils of the surveyed area. The stonier areas seem to produce a good forest stand and should be used for this purpose. On the long slopes some sheet erosion takes place with hoed crops, but most of the cleared areas are in hay or permanent pasture, so that erosion damage is not great on the Elmsdale soils.

Soils developed from sandy loam to loam parent materials

PUGWASH CATENA

The soils of the Pugwash catena occupy a small, but important area in the northeastern corner of the county. They extend in a strip about three miles wide from South Maitland to Maitland. Smaller areas occur in the vicinity of Urbania. The total area occupied by these soils is 15,148 acres or about 1·9 per cent of the county area. The Pugwash soils are developed from a sandy loam till derived principally from reddish-brown sandstone. In some places where fine-grained sandstone or mudstone occurs in the underlying rocks, the till may approach a sandy clay loam in texture. The topography of these soils ranges from gently undulating to undulating and there are a few places where steep slopes are prevalent. Drainage is usually good. The open nature of the soil permits water to percolate moderately rapidly and there is usually enough slope to the surface to ensure adequate surface drainage. A few small areas with imperfect to poor drainage are found on the more level topography. The Pugwash soils are fairly free of stone and stoniness does not generally interfere with cultivation, but where the Pugwash soils are associated with the Hansford soils they tend to be more stony than usual. About one-third of the area of these soils is cleared, while the remainder is forested. Forest cover consists of spruce, fir, birch, maple, and occasional pine.

Only the well-drained member of the Pugwash catena was mapped in Hants county. Scattered areas of imperfectly and poorly drained soils too small to map were included with the well-drained member. Under undisturbed conditions the surface of these soils consists of a greyish-black layer of semi-decomposed leaf litter. It is felty, fibrous and contains numerous roots. This rests on a pinkish-white A_2 horizon which has a sandy loam texture and is loose, porous, and permeated with tree roots. The B horizon, at a depth of 4 to 8 inches, is a yellowish-red to reddish-brown sandy loam, usually structureless and very friable. Roots and sandstone fragments are scattered through this horizon. This grades into a reddish sandy loam B_2 horizon with a weakly developed nuciform structure. It is firm in place but crushes easily when removed. Small sandstone cobbles and fragments permeate the horizon. The parent material or C horizon is found at a depth of 16 to 20 inches. It is a dark red sandy loam, structureless and firm in place. When removed it breaks to a coarse nuciform structure. Numerous fragments and occasional cobbles of sandstone are present and black carbonaceous streaks run through the till.

An undisturbed profile of a well-drained Pugwash soil is described below:

Horizon	*Depth*	*Description*
A_0	0- 2 inches	— greyish-black leaf litter, needles and semi-decomposed organic material, felty; fibrous; numerous roots.
A_2	2- 6 inches	— pinkish-white (7·5 YR 8/2) sandy loam; fine platy structure; loose; porous; numerous roots; sandstone fragments; pH 4·5
B_1	6-13 inches	— yellowish-red (5 YR 5/8) sandy loam; structureless; loose; some roots; numerous sandstone fragments; pH 5·4
B_2	13-19 inches	— red (2·5 YR 4/6) sandy loam; medium nuciform structure; firm; slightly cohesive; occasional roots; fragments and occasional cobbles of sandstone; pH 5·5
C	below 19 inches	— dark red (2·5 YR 3/6) sandy loam; structureless; breaks to coarse nuciform structure; very firm; fragments of grey and brown sandstone; black carbonaceous streaks; pH 5·5

The B_1 is often a reddish-brown color and it may have a granular structure in some places. Most of the Pugwash soils are heavily leached and the A_2 horizon is quite thick. In the imperfectly or poorly drained positions the surface and A_1 layers are thicker than in the well-drained soils and some mottling is present in the B and C horizons.

Utilization of soils

The Pugwash soils are among the best agricultural soils of the county. Although the total area is comparatively small, a larger proportion of these soils is cleared and under cultivation than is the case with most of the other soils of the county.

Their drainage and texture make them suitable for general use and they are better adapted to hoed crops than the finer-textured soils. While a part of the cleared areas is used for hay and pasture, other crops such as grain, potatoes, corn, beans, and peas are grown on these soils. They are easily cultivated and are capable of heavy production when properly managed. Organic matter tends to be lost from these soils more readily than from the heavier soils and for this reason the maintenance of organic matter is an important factor in management. The soils are very acid and require liming. Drainage is normally a minor factor, but a short rotation, the maintenance of organic matter and the use of lime and fertilizers are needed for maximum production. Hay and pasture crops respond well to liming. The soils are capable of greater production than is being obtained at present and proper soil management is needed. Sheet erosion takes place readily on these soils where the slopes are fairly steep and, on slopes over 5 per cent, care should be taken when hoed crops are grown. Maintenance of organic matter and grass cover will prevent serious erosion. The Pugwash soils are suitable for all crops grown in the area and are better suited for potatoes or market garden crops than the heavier soils.

Truro Catena

The soils of the Truro catena occur along the north shore of the county from Maitland to Tennycape. They occupy an area of 6,252 acres or about 0·79 per cent of the county. Truro soils are developed from a sandy loam till derived from Triassic sandstone. The color of this till is striking and it is redder than the other tills found in the county. In a very few places some shale is interbedded with the sandstone and this results in a slightly finer texture in the till. The topography varies from very gently undulating to gently rolling and most of the soils are confined to a fairly level terrace along the shore of Minas Basin. Most of the Truro soils are well drained in Hants county, although a few imperfectly drained places too small to map occur in the more level topography. The Truro soils are free from stone except where they are shallow. Occasional fragments of red sandstone occur in the profile, but the surface is generally free from stone. A large part of the Truro soils is covered with trees, consisting of spruce, maple, and birch.

The well-drained Truro soil under forest cover has a fairly thin layer of organic litter on the surface. The A_2 horizon is variable in depth but it is usually deeper in these soils than in most of the soils in the county. It is white or ashy grey in color and a sandy loam in texture, being granular, friable, and porous. The B_1 horizon, which occurs at a depth ranging from 4 to 9 inches from the surface, is yellowish-red sandy loam, usually loose, granular and containing fragments of sandstone. In some profiles this horizon may be slightly cemented. The B_2 horizon becomes darker in color and slightly heavier in texture but is still a sandy loam. It may exhibit a weak crumb structure

and is moderately firm in place. Roots usually penetrate to the lower part of the B_1 horizon. The parent material occurs at a depth of 18 to 22 inches and is a dark red sandy loam. It is firm in place, but crushes easily to a granular mass. Fragments of red sandstone are present and in the shallower areas the till may be quite stony. A description of the well-drained member of the Truro catena is given below:

Horizon	*Depth*	*Description*
A_0	0- 2 inches	— greyish-black leaf litter and semi-decomposed organic matter; loose and fluffy; numerous fibrous roots; pH 4·2
A_2	2- 6 inches	— light grey (10 YR 7/2) sandy loam; structureless; loose; numerous roots; some sandstone fragments.
B_1	6-12 inches	— yellowish-red (5 YR 5/8) sandy loam; medium granular structure slightly firm; some gravel fragments; pH 4·8
B_2	12-18 inches	— red (2·5 YR 4/8) sandy loam; fine nuciform structure; firm; sandstone fragments and some cobbles.
C	below 18 inches	— dark red (2·5 YR 3/6) sandy loam; very firm; fine nuciform structure; fragments and occasional sandstone flags; pH 5·0

When cultivated the surface soil is a reddish-brown sandy loam to plow depth. Where the soil is heavily leached, the A_2 horizon may still be seen beneath the plowed layer and as streaks in the plowed fields. In the poorly drained positions the B horizon may be indurated and prevent the passage of water.

Utilization of soils

The Truro soils are among the best agricultural soils of the surveyed area and probably superior to the Pugwash soils described above. Unfortunately only a small area of these soils occurs in the county and only about half of this is cleared. The principal areas under cultivation are those at Tennycape Burntcoat Head, Noel, Noel Head, Densmore's Mills, and Noel Shore. Dairying is the chief occupation on these soils. The Truro soils are suitable for an intensive type of farming and can be used for market gardening, potato growing, or small fruits. They are perhaps not so suitable for hay and grain crops as the heavier soils, but good crops may be produced under good management. Some excellent field crops are seen in this area. The soil is easily cultivated and drainage is not usually a problem. In some places there may be a tendency towards excessive drainage. This condition makes the maintenance of a good supply of organic matter a necessity. Liming is essential on the Truro soils since they are very acid. The use of lime and green manuring crops to lower the acidity and improve the structure and water-holding capacity of the soil will make the Truro soils the most productive in the county. They are very responsive to good management. The soils are easily eroded on slopes much over five per cent. Long slopes with less than five per cent gradient also are subject to erosion. Proper soil management and tillage practices will reduce this condition to a minimum.

Hansford Catena

The soils of the Hansford catena occur in several scattered areas throughout the county. The largest single area lies south of the road from Kennetcook to Lattie's Brook. Another area lies north of this road. Smaller areas occur north of Nine Mile River, near Lower Burlington, Summerville, Cambridge and Pembroke, and around Mosherville and Stanley. The total area occupied by these soils is 61,632 acres or about eight per cent of the county.

Hansford soils are developed from a sandy loam till derived principally from reddish-brown and grey sandstones. In some places the till may have a sandy clay loam texture, especially where the Hansford soils come into contact with the Queens soils. Over most of the county the Hansford soils have a gently undulating to undulating topography, but there are a few areas with a rolling relief. Drainage is variable over small areas. In general, surface drainage is good in the Hansford soils, but internal drainage varies from moderately rapid to slow. Over large areas the well-drained and imperfectly drained soils are intimately mixed and these were mapped together as one unit. The slight variations in topography alter the drainage conditions within a short distance. Where areas of poorly drained soils were sufficiently large, they were mapped out. About 95 per cent of the Hansford soils have good to imperfect drainage. Stoniness in these soils is variable and in some places there may be sufficient stone to interfere with cultivation. Most of the Hansford soils are forested. The chief tree cover consists of spruce, fir, birch, poplar, and maple. Hardwoods such as maple and birch are dominant on the well-drained ridges.

The well-drained member of the Hansford catena, when developed under forest has a one to three-inch layer of organic material on the surface. This is felty and of the fibrous mor type. Underlying this, the A_2 horizon is a pinkish-grey sandy loam, usually structureless and slightly firm in place. It may contain some angular sandstone fragments and often is permeated with roots. It is variable in thickness and may range from one inch to six or seven inches. The B_1 horizon is a yellowish-brown to strong-brown sandy loam with a fine crumb structure. It is moderately friable, but quite firm in place and contains angular stone fragments. The lower B horizon is a brown to light reddish-brown sandy loam having a granular structure. It is firm to compact in place and contains angular stones and cobbles. Tree roots may often be observed in this horizon. The C horizon or parent material occurs at a depth ranging from 18 to 26 inches and is a dark reddish-grey or reddish-brown sandy loam. It is very firm, but crushes to a fine nuciform structure and may be slightly mottled. Angular pieces of sandstone and occasional shale fragments are found in this horizon. In many places it has been found that the till becomes heavier in texture at a depth of three to four feet and the texture of the C horizon may be a sandy clay loam.

The well-drained profile of a Hansford soil is described below:

Horizon	*Depth*	*Description*
A_0	0- 3 inches	— black, semi-decomposed organic matter; felty; fibrous mor type; pH 4·0
A_2	3- 9 inches	— pinkish-grey (7·5 YR 7/2) sandy loam; structureless; firm; friable; some angular stone fragments; some roots.
B_1	9-14 inches	— strong brown (7·5 YR 5/6) sandy loam; moderately developed fine crumb structure; friable; firm in place; stone fragments and good root distribution; pH 4·8
B_2	14-20 inches	— brown (7·5 YR 5/4) sandy loam; fine granular structure; firm to compact, angular stone fragments and cobbles; occasional roots.
C	below 20 inches	— dark reddish-grey (5 YR 4/2) sandy loam; fine nuciform to fragmental structure; very firm; angular cobbles; pH 5·0

In many places the B horizon is a lighter color than that described above and the B_2 horizon is reddish brown. The imperfectly drained soils are usually more heavily leached than the well-drained and the profile is somewhat darker in color. The profile usually shows mottling from the lower part of the B_1 horizon downward. There are a few places such as the area south of Kennetcook where the underlying sandstone comes close to the surface and here the soil is very stony and very sandy, closely resembling the Shulie soils mapped in Cumberland and Colchester counties.

The poorly drained soils of the Hansford catena are found in depressional areas between the ridges and on the more level topography. The largest areas occur along Robinson and Indian brooks and north of Stanley. In these places there seems to be little stone in the profile and the soil appears to have been modified by water at some time. The surface soil consists of a thick layer of poorly decomposed organic matter. This rests on a thick, grey sandy loam, A_2 horizon that is highly mottled. The upper B horizon is brown sandy loam, quite firm and highly mottled. This grades into the reddish-brown sandy clay loam B_3 horizon which sometimes develops a blocky structure. It is also mottled with yellowish streaks. The parent material at a depth of 18 to 20 inches is a highly mottled reddish-brown sandy clay loam. Some angular sandstone fragments occur throughout the profile, but the stone content is not so high as in the better drained soils. Occasional boulders may be found on the surface.

Utilization of Soils

The area of Hansford soils under cultivation is small. Most of the cleared land on these soils is found in the western part of the county. Stoniness and drainage are the major problems connected with agricultural development. The soils in the western part of the county are sandier and contain less stone than in the areas around Kennetcook and Nine Mile River. The natural fertility of the Hansford soils is quite low and the soils tend to be droughty due to their open nature. Hay, grain and corn give low yields, but these can be improved when organic matter is increased and lime and fertilizers are used. Hay fields tend to run out quickly and become weedy. It was observed that manure applied to hay fields led to greatly increased yields on these soils. At present the Hansford soils are marginal or submarginal agricultural soils and are best suited to forest. There are a few selected areas where these soils might prove suitable for agricultural use but these are scattered and isolated.

Rawdon Catena

The Rawdon soils occur along the northern border of the upland plain extending south and east of Gore and in the vicinity of Rawdon and Newport Corner. The total area occupied by these soils is 37,625 acres or about 58·8 square miles. The Rawdon soils are developed from a loamy till derived principally from the slates and shales which underlie the upland areas. In some places the till may approach a clay loam in texture. Rawdon soils usually have a rolling relief, but certain areas, such as in the vicinity of Rawdon, are hilly in nature. In general, the soils are well drained. They have enough slope to ensure fairly rapid surface drainage and internal drainage is moderately rapid due to the fact that the underlying rock contains nearly vertical drainage channels and the till is quite porous. In some areas of low relief or where the bedrock is close to the surface, imperfect or poor drainage

occurs. No large boulders or stones occur in the soil, but the surface is frequently broken by outcrops, especially in the more hilly areas. The tree cover found on the Rawdon soils consists principally of maple, birch, spruce, hemlock, and occasional pine.

Under this type of vegetation the well-drained soils have a surface layer of black, semi-decomposed organic material which is fibrous and felty and held together with numerous roots. Beneath this, the leached, greyish-sandy loam A_2 horizon is often very patchy and may be absent in some profiles. The upper subsoil is a yellowish-brown sandy loam to loam. It is generally loose and porous and contains numerous slate fragments. Root penetration to this horizon is good. The lower B horizon is a greyish-brown or slightly olive-colored loam. It is often structureless and quite firm and contains numerous slate fragments and occasional flaggy pieces of slate. The C horizon occurs at a depth of 17 to 22 inches and is a greyish-brown loam. It is structureless, firm to compact and crushes to a fragmental structure. Numerous slate fragments and larger pieces are present. The whole profile is acid throughout.

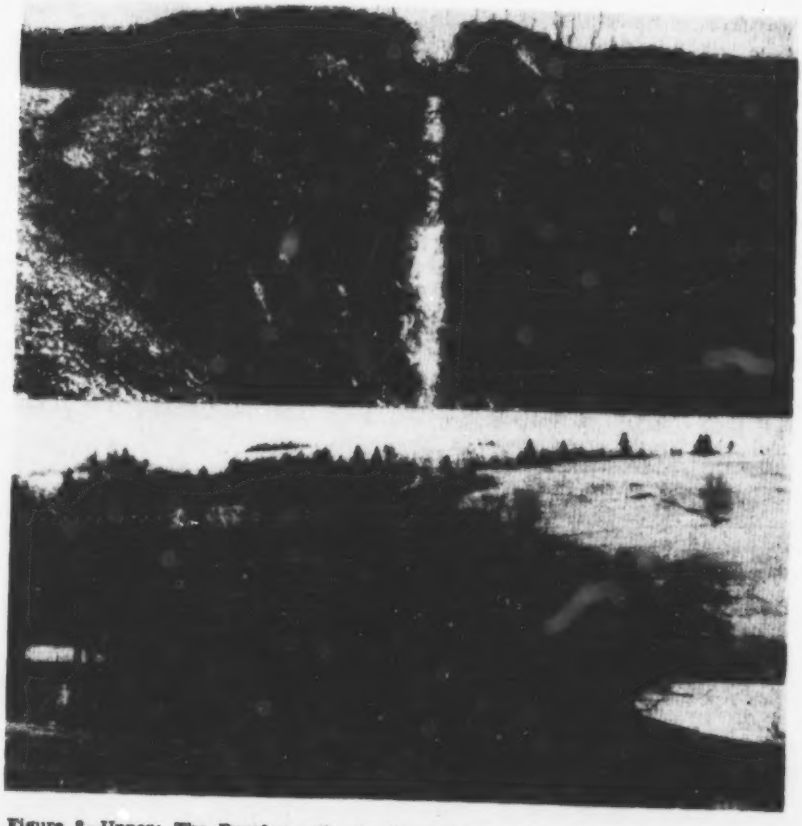


Figure 8—Upper: The Rawdon soils developed from slate are usually shallow over bedrock. Lower: Steep slopes and hilly relief are typical of the Rawdon soils.

A description of a well-drained Rawdon soil is given below:

Horizon	*Depth*	*Description*
A_0	0- 2 inches	— black, semi-decomposed organic material; felty; fibrous; porous; numerous roots; pH 4·5
A_2	2- 4 inches	— white (10 YR 8/1) sandy loam; weakly developed platy structure; often thin and patchy; contains numerous fine shale and slate fragments.
B_1	4-12 inches	— yellowish-brown (10 YR 5/6) sandy loam; granular structure; loose; numerous slate fragments; many roots; pH 4·8
B_2	12-23 inches	— greyish-brown (2·5 Y 5/2) loam; structureless; firm; numerous slate fragments; some roots.
C	below 23 inches	— greyish-brown (10 YR 5/2) loam till; structureless crushes to fragmental structure; firm to compact; contains considerable slate; pH 5·2

In a few places where shale occurs the texture throughout may be slightly finer. Where the Rawdon soils are in contact with the Elmsdale soils the till is browner and the profile somewhat darker in color than normal. In the poorly drained positions the surface layer is thick and mucky in appearance and the A_2 horizon is well developed. The B horizon is mottled and stained with iron and the subsoil is more compact.

Utilization of Soils

In former years large areas of the Rawdon soils have been cleared. Many of these have been abandoned and are now returning to forest. Only limited areas of the Rawdon soils are being cultivated at present. The principal crops are hay and grain, but some potatoes, corn and garden crops are grown on the coarser-textured soils. The soil appears to be quite fertile when first cleared, but runs out in two or three years due to loss of organic matter and the effects of erosion. Water erosion is very prevalent on these soils and many large fields are gullied and their usefulness impaired. The Rawdon soils support an excellent tree growth, since their porosity and the nature of the underlying slate allows tree roots to penetrate deeply. In the vicinity of Gore, the Rawdon soils are very shallow and numerous outcrops occur on the hills. These slopes are best suited to forest. On some of the more level areas where the till is deeper, Rawdon soils may be suitable for potatoes, provided good soil management is practised.

Halifax Catena

The soils of the Halifax catena occupy 44,518 acres or about six per cent of the surveyed area. The soils occur in the south-central part of the county north of Mt. Uniacke and westward to south of Three Mile Plains. The Halifax soils are developed from a coarse-textured, stony till derived from quartzites and hard grey sandstone. A small quantity of slate is also found in the till. The topography is usually rough and varies from rolling to hilly with an undulating micro-relief. The drainage over large areas is variable and short stony ridges are interspersed among poorly drained depressions making it difficult to separate any well-defined drainage areas. Where there is sufficient slope for the water to run off, the soils are well drained. Internal drainage is usually rapid, since the soils are open and porous. The Halifax soils are generally shallow and stony. Numerous outcrops and boulders appear on the surface. Practically all of the Halifax soils in Hants county are

covered with forest which consists of white spruce, maple, birch, and pine on the better drained areas, and black spruce, hemlock and poplar on the more poorly drained sites. In places where the quartzite is exposed, there are barren areas interspersed with swampy depressions and boulder ridges.

Under forest and well-drained conditions the surface soil consists of black semi-decomposed organic material, leaves, needles and a small portion of mineralized organic matter. It is felty and porous and held together with numerous roots. This organic-matter accumulation is usually thin and does not exceed a thickness of two inches in Hants county. This is underlain by a greyish sandy loam A_2 horizon, which varies greatly in depth even in a single profile. It is loose and structureless and contains quartzite stones and numerous roots. The upper part of the subsoil is a yellowish-brown sandy loam with a crumb structure. It is loose and contains quartzite cobbles. Good root development occurs in this horizon. The lower subsoil is a yellowish-brown or yellowish-red sandy loam with a gritty feeling. It has a medium crumb structure and contains numerous angular quartzite cobbles. Some roots may be present. The parent material, which occurs at depths ranging from 16 to 26 inches, is a greyish-brown to light olive sandy loam. It is quite firm in place, but friable when crushed in the fingers. Quartzite cobbles and stones are numerous and some slate fragments may be present. The profile varies in depth from a few inches in shallow areas to about 32 inches in the deeper places. In a few places the till has a darker color where it is near soils developed on the reddish-brown till derived from Carboniferous rocks.

A description of a well-drained Halifax profile under forest cover is given below:

Horizon	*Depth*	*Description*
A_0	0-2 inches	—black leaf litter, matted roots and semi-decomposed organic material; loose; numerous roots; pH 5·0.
A_2	2-5 inches	—pinkish-grey (7·5 YR 7/2) sandy loam; fine platy structure; loose; numerous angular cobbles pH 4·5.
B_1	5-15 inches	—strong brown (7·5 YR 5/6) sandy loam; medium crumb structure; loose; good root development; numerous quartzite cobbles; pH 5·0.
B_2	15-23 inches	—yellowish-brown (10 YR 5/4) sandy loam; medium crumb structure; slightly firm; friable; some roots; numerous angular quartzite cobbles.
C	below 23 inches	—greyish-brown (10 YR 5/2) gravelly sandy loam; medium crumb structure; moderately firm; friable; quartzite stones and cobbles; pH 5·2.

The till underlying the soils in the area south of Three Mile Plains and around St. Croix is darker than that found farther east around Mt. Uniacke, due to the proximity of the reddish-brown tills of the other soils of the area.

Utilization of Soils

Only small areas of the Halifax soils are cleared and these are used chiefly for pasture. Where the cleared areas are not too stony, some hay is grown, but in general the Halifax soils are unsuitable for agricultural purposes. Small local areas are cultivated, and potatoes, beans, buckwheat, and garden crops are grown. Yields are low except in newly cleared land. Even where stoniness is not too great there are not large areas of well-drained soils and intermittent poorly drained depressions preclude the possibility of obtaining a fair sized well-drained field. The porous nature of the soils makes them well suited to forest and they support a good stand of trees. Where other land is available the Halifax soils are better left in forest.

Gibraltar Catena

The soils of the Gibraltar catena are confined to a single large area in the southern part of the county, where they occupy 171,680 acres or nearly 22 per cent of the county. The Gibraltar soils are developed from a coarse-textured till derived principally from granite. In the granite areas of Hants county, particularly in the areas of Windsor and Three Mile Plains, the granite till has been mixed in some places with some of the reddish-brown till from the north and is colored by it. Normally the till of the granite soils is a greyish-brown or pale brown sandy loam. The topography varies from rolling to hilly and usually the granite soils occur at a higher elevation than the other soils of the county. The nature of the relief ensures adequate surface drainage and internal drainage is usually moderately rapid. Like the Halifax soils, drainage of the Gibraltar soils is dependent on topographic position and innumerable wet depressions are scattered throughout the area. In many places the granite outcrops over several acres and boulders weighing many tons are frequent on these soils. The forest cover consists of maple, birch, beech, spruce, and hemlock, the hardwoods being dominant.

Under forest cover the well-drained soil has a thin black surface layer of partly decayed organic matter. This is underlain by a greyish or whitish sandy loam leached layer of variable depth. It exhibits a platy structure and contains numerous roots and granite rock fragments. The upper subsoil is a yellowish-red or orange colored sandy loam with a gritty feeling. It is very friable and in well-developed profiles it has a dark staining from organic-matter deposition. The lower part of the subsoil is a yellowish-brown to strong-brown sandy loam containing considerable granite pebbles and occasional boulders and grades into the greyish-brown gravelly sandy loam parent material. A profile of a well-drained Gibraltar soil is described below.

Horizon	*Depth*	*Description*
A_0	0-2 inches	—black leaf litter, matted roots; semi-decomposed organic matter; loose; very friable; PH 4·0.
A_0	2-5 inches	—white (10 YR 8/2) sandy loam; weakly developed fine platy structure; loose; numerous roots; some gravel; pH 4·3.
B_1	5-6 inches	—very dark brown (7·5 YR 4/6) sandy loam; granular structure; friable.
B_2	6-11 inches	—very strong-brown (7·5 YR 5/9) sandy loam; medium granular structure; slightly firm; friable; some roots; some gravel; pH 5·0.
B_3	11-23 inches	—yellowish-brown (10 YR 5/6) sandy loam; medium granular structure; slightly firm; friable; some roots; angular granite cobbles.
C	below 23 inches	—yellowish-brown (10 YR 5/6) gravelly sandy loam; structureless; firm; some gravel and granite cobbles; pH 4·8.

This represents a fully developed profile but only in a very few places is the thin B_1 horizon present. In the vicinity of Vaughan the granite till has been mixed with the reddish-brown till from the north and consequently is darker in color. The soils developed in this area are deeper than in most granite areas. On the lower slopes of the hills the soils are imperfectly drained.

Here the B_1 horizon is a dark greyish-brown color, and the B_2 horizon is a yellowish-grey, mottled coarse sandy loam. The parent material is mottled with grey and red streaks and is quite firm in place. Granite stones and boulders are everywhere present on the surface.

Utilization of Soils

With the exception of a few isolated local fields, none of the Gibraltar soils are under cultivation. The small cleared areas are used for hay, grain, potatoes, and garden crops. Yields are low, unless fertilizer is applied. Spectographic analysis shows that hays grown on these soils have a low cobalt content, which results in a deficiency disease in cattle which graze on the land. The Gibraltar soils are best suited to forest and should be used for this purpose.

B. SOILS DEVELOPED FROM WATER-DEPOSITED MATERIALS

The soils developed from water-deposited materials are found along the stream courses and estuaries throughout the county. They occupy a total of 42,880 acres or about five per cent of the surveyed area. The parent materials are derived from a variety of sources and laid down in different ways. The deposits that were laid down by streams flowing from and within the glacial ice sheets take the form of outwash plains, kames, terraces, and eskers. Generally these deposits are above the level of the present flood plain. These materials are coarse textured and more or less sorted or stratified and are derived principally from rocks of the upland plain. They form the parent materials from which the Hebert, Torbrook, and Cornwallis soils are developed. These soils have reached equilibrum with their environment and have well-developed profiles.

The materials deposited by subsequent streams are more recent and are composed of fine material washed from the till at higher elevations. These deposits take the form of flood plains and estuarine deposits and are the parent materials from which the Stewiacke, Acadia, and Cumberland soils are developed. These soils have not had sufficient time to develop profile characteristics. The soils developed from water-deposited materials are described in detail in the following pages.

Soils developed from sands and gravelly sandy loam deposits

Hebert Catena

The soils of the Hebert catena occur in scattered areas throughout the county. The largest areas of these soils are found in the vicinity of Nine Mile River, Upper Rawdon, West Gore, Stanley, Upper Kennetcook, and Windsor Forks. Other smaller areas occur in different places. The total area occupied by the Hebert soils is 8,640 acres. The parent materials of the Hebert soils are sandy deposits derived from igneous and metamorphic rocks. The materials have been sorted by water and vary in size from fine sand to cobbles. The topography varies from nearly level outwash plains to undulating terraces and ridge-like eskers. Drainage is often excessive. The open porous nature of the soil permits rapid percolation of water and the greater proportion of the soils are well drained. Some depressional areas, too small to map, have poor drainage due to the nature of the relief or to cementation in the lower horizons of the soil which prevent percolation of water. In a few places lenses of till or clay may restrict internal drainage. Hebert soils are usually not very stony except where the material is in the form of kames or eskers. Here there is a larger proportion of gravelly and cobbly material and occasional boulders may occur on the surface. Vegetation consists principally of spruce, fir, pine, poplar, and birch.

Under forest conditions the well-drained soils of the Hebert catena have a thin layer of poorly decomposed organic material on the surface. This rests on a greyish A_2 horizon of variable depth. It is usually structureless and loose and may contain some gravel. The B_1 horizon is yellowish-brown or light brown in color and has a sandy loam texture. It is very friable and contains tree roots. Variable amounts of gravel may be present. This horizon becomes darker in color and somewhat firmer with depth and usually the gravel content increases. The C horizon occurs at a depth of 20 to 26 inches and is a brown sandy loam, usually coarse and gritty. It may be loose and structureless or weakly cemented and firm. Considerable gravel is present and occasional cobbles may occur throughout the profile.

The description of a well-drained profile of a Hebert soil is given below:

Horizon	*Depth*	*Description*
A_0	0-2 inches	—dark grey leaf litter and semi-decomposed organic material; soft; loose; numerous roots.
A_2	2-6 inches	—pinkish-grey (7.5 YR 7/2) sandy loam; medium granular structure; loose; friable; numerous roots; pH 3.8
B_1	6-13 inches	—yellowish-brown (10 YR 5/9) sandy loam; granular structure; very friable; numerous roots; some gravel; pH 4.2
B_2	13-22 inches	—dark brown (7.5 YR 4/4) gravelly sandy loam; granular structure; slightly firm; friable; occasional cobbles; some roots.
C	below 22 inches	—dark brown (7.5 YR 4/2) gravelly sandy loam; granular structure, firm; porous, occasional cobbles; pH 4.8

A small area near Upper Nine Mile River has been included with the Hebert soils. The upper part of the profile resembles the Hebert soils in that the B is yellowish-brown sandy loam to fine sandy loam. The profile rests on a varved clay which gives the soil a better moisture-holding capacity. A few very small areas of a few acres in extent are found in other places in the county.

Poorly drained Hebert soils occur in depressional areas or where the lower horizons have become cemented or indurated and water cannot drain away. These soils have a thick, mucky organic surface and a fairly deep A_2 horizon. The subsoil is dark brown to reddish brown in color and is highly mottled with yellow streaks. It is usually very firm or compact in place. Areas of these soils, too small to map, were observed in Hants county.

Utilization of soils

The Hebert soils, because of their excessive drainage, are not considered to be good agricultural soils. There are a few small areas, similar to those mentioned above, where fine sand or the nature of the underlying material increases the moisture-holding capacity of the soil and such areas may be suitable for garden crops. Hay and grain give low yields on Hebert soils. The soils are heavily leached and low in organic matter and natural fertility. Management practices on these soils would include the maintenance of organic matter and heavy fertilization if good yields are to be obtained and probably this would not justify the expense. The use of these soils would depend on the opening of a market for a product that would make heavy expenditures for fertilizers profitable. The soils are capable of supporting an excellent growth of pine and are more profitably used for this purpose.

Torbrook Catena

The soils of the Torbrook catena occur in small detached areas around Bramber, Upper Newport, Newport, and St. Croix. They are not very important agriculturally and occupy an area of 2,969 acres. The Torbrook soils are developed from sandy loam materials derived chiefly from slates and shales with a small mixture of igneous and metamorphic rocks. The topography varies from level terraces to kames and eskers depending on the mode of deposition. The nature of the relief and the open nature of the soils ensures rapid drainage. Usually the soils on the terraces contain more fine material and are not so excessively drained as those developed on kames and eskers. These soils seem to have a slightly better moisture-holding capacity than the Hebert soils. The surface is usually free from large stones, although occasional boulders do occur. Most of the areas of these soils in Hants county are cleared. The natural vegetation consists of spruce, fir, birch, and occasional pine.

The well-drained soil under virgin conditions has a thin layer of leaf litter and needles on the surface. This is underlain by a dark greyish-brown layer (A_1 horizon) in which the organic matter is thoroughly mixed with the mineral material. Numerous roots permeate the horizon which is loose and fluffy in consistency. This A_1 horizon is present only in well-developed profiles that have never been disturbed. The A_2 horizon is yellowish-grey sandy loam, varying in depth from a trace to several inches. It is loose and granular and full of roots. This rests on the brown sandy loam B_1 horizon which is loose and contains numerous fragments of slate and some igneous material. It grades downward through the brown sandy loam B_2 horizon of the same structure, but somewhat firmer consistency, to the parent material at a depth of 23 to 30 inches. This is a brown, often with a reddish cast, gravelly sandy loam containing slaty pieces and gravel. It is quite firm in place and may occasionally contain granite boulders and slate blocks.

A detailed description of a well-drained Torbrook soil is given below.

Horizon	*Depth*	*Description*
A_0	0-2 inches	—very dark greyish-brown to black leaf litter and semi-decomposed organic matter; loose; fluffy; numerous roots; pH 4·0.
A_2	2-5 inches	—pale brown (10 YR 6/3) sandy loam; fine granular structure; loose; numerous roots; some gravel.
B_1	5-10 inches	—strong brown (7·5 YR 4/9) sandy loam; granular structure; loose; numerous roots; numerous slate fragments; pH 4·5.
B_2	10-23 inches	—strong brown (7·5 YR 5/8) sandy loam; medium granular structure; firm; some roots; numerous slate fragments and some cobbles.
C	below 23 inches	—strong brown (7·5 YR 5/6) sandy loam; structureless very firm; flags and cobbles of slate and some igneous material pH 5·5.
D	X X	—shaly gravel.

There are several local variations of the profile described above. The whole profile may contain considerable sand and very little slate or gravel or there may be a considerable amount of thin slate fragments throughout the profile. No poorly drained areas were mapped in Hants county and practically all of the Torbrook soils are well drained in the surveyed area.

Utilization of Soils

In Hants county most of the Torbrook soils are cleared. They are used for hay, grain, potatoes, and pasture, but the cultivated acreages are small. The soils in general have a slightly better moisture-holding capacity than the Hebert soils, although there are some areas where they tend to be droughty. Torbrook soils require organic matter to increase their moisture-holding capacity and to improve their texture. The soils are low in natural fertility and fertilizers are required to produce suitable yields. The soils on the level terraces are the best suited for production of market garden crops when moisture content is adequate and fairly good stands of corn have been observed on these areas. The Torbrook soils are not of great agricultural importance in Hants county and if other soils are available the Torbrook soils should be allowed to remain in forest. Where these soils have been mapped in Kings county, they have been used for orchard with varying success.

Cornwallis Catena

Although soils of the Cornwallis catena have been mapped extensively in the Annapolis Valley, only a single small area of 480 acres occurs in Hants county. The Cornwallis soils are developed from glacio-fluvial sands derived from igneous and sedimentary rock material. The topography ranges from nearly level to undulating. The soils are often excessively drained and water percolates through the soil quite rapidly. In places where the sand is very fine, the percolation of water is less rapid. The Cornwallis soils are practically free from stone, but they may contain considerable gravel and pebbles. The principal tree growth on these soils consists of birch and pine.

Under forest cover the well-drained soil has a very thin layer of leaf litter and needles on the surface. This organic material is loose, fluffy and full of roots. In a few places an A_1 horizon may be observed and the organic matter has become mineralized to some extent. The A_2 horizon is well developed and consists of a thick, pale brown sandy loam layer with a granular structure which is loose and porous. Numerous roots penetrate this horizon. The upper part of the subsoil is a yellowish-red sandy loam with a granular structure and is slightly firm in place. This grades downward through a yellowish-red B_1 horizon, which is firm, into the yellowish-red sandy loam C horizon at a depth of 28 to 36 inches. This horizon is firm and may be slightly cemented and contains some gravel.

In Hants county the Cornwallis soils have practically all been cleared and the organic surface layer has been mixed with the underlying leached layer.

A description of a well-drained Cornwallis soil which has been cleared is given below:

Horizon	*Depth*	*Description*
A	0-6 inches	—dark brown (10 YR 4/3) sandy loam; granular structure; loose; pH 4·5.
A_2	6-18 inches	—very pale brown (10 YR 8/3) sandy loam; structureless; loose; some fine gravel.
B_1	18-24 inches	—yellowish-red (5 YR 5/6) sandy loam; structureless; slightly firm; small amount of gravel; some roots; pH 4·8.
B_2	24-38 inches	—yellowish-red (5 YR 5/8) sandy loam; fine granular structure; friable; slightly firm.
C	below 38 inches	—yellowish-red (5 YR 4/8) sandy loam; fine granular structure; firm; friable; pH 5·0.

Cornwallis soils are usually finer textured than the Hebert or Torbrook soils and they develop deeper profiles in which the color of the B horizon has a reddish cast not found in the Hebert or Torbrook soils.

No poorly drained soils of this catena occur in Hants county.

Utilization of Soils

The small area of Cornwallis soils in Hants county has practically all been cleared and it is used for hay, grain, pasture, orchard, and vegetables. Where moisture conditions are adequate and organic matter is maintained, fair crops of hay, grain, and vegetables are grown. Stands of hay and grain are usually thin and yields are low due to lack of sufficient moisture during the growing season. The soils are generally unsuitable for pasture and orchards are not very successful on these soils. The Cornwallis soils will support a good growth of pine trees and where moisture conditions make them unsuitable for crops, the planting of trees should be encouraged.

Soils Developed from Reddish-Brown Silty Clay Loam Deposits

Stewiacke Catena

The soils of the Stewiacke catena are scattered along the river courses and estuaries throughout the county. The larger well-drained areas occur near Lantz, Stanley, Upper Rawdon, and along the Avon and St. Croix rivers. Imperfectly and poorly drained soils also occur in scattered areas. The total area occupied by the Stewiacke soils is 9,068 acres or about one per cent of the surveyed area. The soils of the Stewiacke catena are developed from fine-textured materials derived principally from local sources. Much of this material has been washed from the reddish-brown tills of the lowland plain and their influence on the color of these soils is very evident.

The topography varies from level to very gently undulating and there are a few areas that are depressional in nature. The drainage of these soils is variable and depends on the texture, structure, and position of the soils. About 70 per cent of the soils are well drained and the remainder are poorly drained. The Stewiacke soils are free from stone and very desirable for agricultural purposes. Where trees occur they consist of spruce, willow, and alder.

The Stewiacke soils have not developed profile characteristics that are common in the other soils of the area. The constant flooding and deposition of sediments have not left the deposits undisturbed for sufficient time to develop a true profile.

Where the Stewiacke soils are well drained, the soils have a dark brown silt loam to clay loam surface, which has a friable, crumb structure. Underlying this at a depth of 5 to 8 inches is a reddish-brown silt loam layer. This layer often has a laminated structure. It is friable when dry and somewhat plastic when moist. At a depth of 15 to 18 inches the texture becomes slightly heavier, and a blocky type of structure develops. The soil becomes darker in color with depth and a third layer may be distinguished at a depth ranging from 22 to 30 inches. Below this there is little change in color, structure, or texture for considerable depth.

A description of a well-drained Stewiacke soil is given below:

Depth	*Description*
0-5 inches	—very dark greyish-brown (10 YR 3/2) silt loam; fine crumb structure; friable; no stones; pH 5·8.
5-24 inches	—reddish-brown (5 YR 4/6) silt loam; laminated structure; crushes to fine crumb; moderately plastic; no stones.
below 24 inches	—dark reddish-brown (2·5 YR 3/4) silt loam; fine blocky structure; moderately plastic; pH 5·6.

The thickness of the layers and their structure and consistency will vary somewhat in different places. Some profiles are more acid than the one described above. In the poorly drained areas the soil has a mucky surface and poor structure. The water table remains at a high level throughout the year.

Utilization of Soils

The Stewiacke soils are among the best agricultural soils of the county. Their use is somewhat limited in places where they are subject to flooding, but generally these soils are suitable for crop production during the growing season. In Hants county hay and grain are the principal crops grown on these soils. There are some areas where poorly drained depressions are interspersed through the well-drained areas or where sand spots have been flooded over the soil. This makes crop yields spotty and reduces the value of the land. Drainage of these soils is sometimes difficult since they lie very little above the present drainage channels and only by deepening these channels can good drainage be accomplished. Some of the Stewiacke soils have been dyked similar to the Acadia soils described below and this overcomes the possibility of flooding. Where they are well drained the Stewiacke soils are suitable for most crops grown in the area.

Acadia Catena

The soils of this catena are located along the estuaries of the larger rivers such as the Avon, St. Croix, and Kennetcook. In all, they occupy an area of 7,218 acres. The Acadia soils are developed on materials similar to those of the Stewiacke soils which have been worked and redeposited by the action of tidal waters. The topography varies from level to very gently undulating. The drainage of a large part of the Acadia soils is imperfect, but there are a few well-drained areas. The soils are free from stone and in many respects are similar to the Stewiacke soils. Natural vegetation consists chiefly of marsh grasses such as spartina, fox grass, and black grass. The well-drained member of the Acadia catena is similar to the well-drained Stewiacke soil. The Acadia soils also develop no true profile characteristics. Where drainage is fairly good, the surface soil is a light reddish-brown silty clay loam with a weakly developed platy structure. It is cohesive, but crumbles readily to a friable mass and is permeated with grass roots. Below this, to a depth varying from 15 to 25 inches, is a greyish silty clay. It is mottled with brown streaks or, in very well-drained areas, the whole layer may be brown. It has a well-developed nuciform structure and contains the remains of sedges and grass roots. Underlying this is a reddish-grey silty clay layer mottled with greyish streaks. It is massive and plastic. A description of an imperfectly drained Acadia soil is given below:

Depth	*Description*
0-6 inches	—light reddish-brown (5 YR 6/4) silt loam; weakly developed platy structure; crushes to fine nuciform structure; moderately plastic; fibrous roots.
6-23 inches	—grey (7·5 YR N/5) silty clay; loam; medium nuciform structure; mottled with dark brown streaks; firm; numerous roots.
below 23 inches	—dark reddish-grey (5 YR 4/2) silty clay; loam; massive; plastic; firm; greyish mottling; contains remains of sedges and marsh grasses.

The poorly drained soils have a surface layer which contains considerable organic matter and the underlying layers are grey, fairly plastic, highly mottled and impermeable to water. These areas comprise the salt marshes found outside the dyked lands as well as depressional areas within the dyked lands.

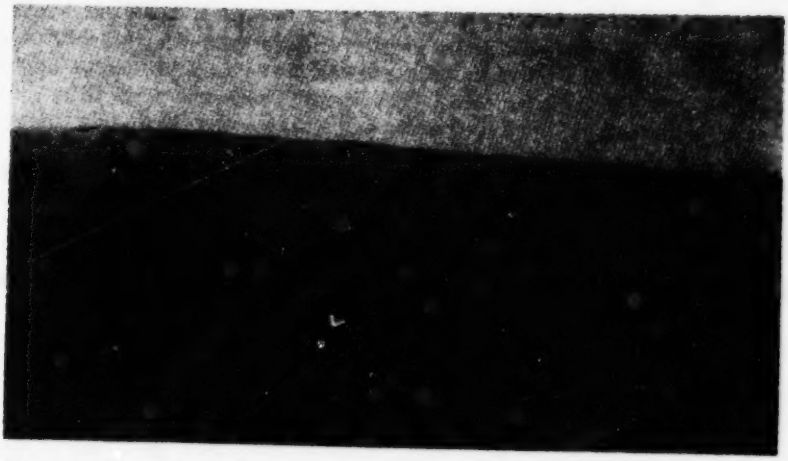


Figure 9—The upland often rises sharply from the lowland. Acadia soils in foreground; Halifax soils on the ridge.

Utilization of Soils

The Acadia soils, like the Stewiacke soils, are highly favorable for agricultural purposes. They possess a fairly high level of natural fertility and the major problem is the provision of adequate drainage and prevention of flooding. The principal crops grown on these soils in Hants county are timothy and clover hay and grain, and good yields are obtained. The productive capacity of these soils can be increased through proper management and the use of

Figure 10—Where the slopes are not too steep the Rawdon soils are used for farming.

fertilizers. Applications of manure or organic matter improve the structure of the surface soil. The use of lime on these soils is beneficial and increases hay yields considerably. The soils are usually left in hay for many years, often because drainage conditions make this the most suitable crop. Experience shows that where drainage is adequate, the Acadia soils are suitable for most general farm crops and provide good pasture.

The poorly drained soils are generally unsuitable for farm crops. Some of these areas might be improved with drainage, but it is doubtful if this would be profitable at the present time. The greater proportion of these poorly drained soils lies outside the dyked areas and is frequently flooded by tides.

Immature Soils Developed from Reddish-Brown Sandy Loam Deposits

Cumberland Catena

The soils of the Cumberland catena are widely scattered throughout the county. They occur along most stream channels and terraces and occupy a total area of 6,822 acres. The Cumberland soils are developed from light-textured materials derived from local sources and deposited along the upper reaches of the stream courses. The topography is usually level or very gently undulating in the larger areas. Drainage in these soils is usually good and water percolates readily through the profile. In some places the soils are subject to intermittent flooding. Most of the deposits are underlain by gravel and in a few cases the soil may be excessively drained. They are relatively free from stone. Where tree cover occurs it consists of spruce, fir, red maple, and occasional pine.

Like the other immature water-deposited soils of the area, Cumberland soils do not develop a definite profile. The surface soil is a 6- to 8-inch layer of reddish-brown fine sandy loam to loam, which is friable and has a fine crumb structure. Below this, to a depth of 20 to 26 inches, the soil is a reddish-brown sandy loam weakly laminated due to variation in the rate of deposition. There may be considerable gravel in this layer. This rests on coarser reddish-brown sand or gravel at depths ranging from 25 to 30 inches.

A description of a typical well-drained profile of the Cumberland soils is given below:

Horizon	*Depth*	*Description*
	0-8 inches	—reddish-brown (2.5 YR 4/4) fine sandy loam; fine crumb structure; loose; porous; good root development; pH 4.5
	8-22 inches	—dark reddish-brown (2.5 YR 3/4) sandy loam; weakly laminated; granular; slightly firm; some roots; some gravel; pH 5·4
	Below 22 inches	—light reddish-brown (2.5 YR 6/4) sand and gravel becoming coarser with depth; firm; pervious; pH 5.5

The poorly drained areas lie at the back edges of the deposits farthest from the present river course, where they receive drainage from the higher land and where the water cannot drain away rapidly. Here the soils are mottled, the lower layers are often quite compact and the gravel is slightly cemented.

Utilization of soils

The major problem on the Cumberland soils is flooding. Since they occur along the banks of the upper reaches of the streams, they are often flooded during spring freshets and materials are deposited on the surface. The better agricultural areas are those that are not flooded very often or are now built up above the flood level and have sufficient fine materials to hold moisture during the growing season. These soils are suitable for a wide variety of crops but it is necessary to maintain a good supply of organic matter. Hay, grain, and hoed crops are grown on these soils with varying success, depending on soil management.

The poorly drained areas are not suitable for crop production. Nearly all the Cumberland soils are cleared and hay is the principal crop grown on these soils throughout the county.

C. MISCELLANEOUS SOILS.

Swamp

The areas mapped as swamp are widely scattered throughout the county. They occur in association with every soil type and represent a very poorly drained member of the soil catena on which they occur. Swampy land occupies a total area of 8,633 acres or more than one per cent of the county. It occurs on every type of parent material in the county with the possible exception of some of the water-deposited materials, but even here swampy depressions may occur in a few small areas. The topography varies from level to depressional and the soils are saturated with water for a large part or all of the the year. The nature of the parent material, the bedrock, the topography or a combination of these factors may prevent water from draining away. The swampy areas have a variable amount of stone, ranging from almost stone-free to bouldery and are covered with a fairly dense growth of black spruce, tamarack, poplar, and fir. Open areas are covered with sedges, reeds, and water-loving plants.

The surface of these soils consists of a fairly thick layer of organic material, poorly decomposed and acid in reaction. The underlying material is grey and highly mottled and grades downward into a mottled grey and yellowish or reddish-brown compact horizon. Soil development is not very deep, usually not exceeding 12 to 15 inches and a high water table is always present. These areas are unsuitable for agricultural use at present.

Peat

The areas mapped as peat are scattered throughout the county and occupy a total of 5,824 acres. The largest areas occur north of the Kennetcook river between Mosherville and Riverside Corner. These areas are the sites of former shallow lakes and depressions that have been filled in with vegetation. Most of the areas are devoid of trees except for occasional stunted tamarack or spruce.

The surface layer consists of sphagnum and other mosses, sedges and reeds one to three feet in depth. This is underlain by layers of the same material in various stages of decomposition and may reach depths of 15 to 20 feet.

AGRICULTURE

History and Development of Agriculture

The earliest inhabitants of Hants county were the Indians. The principal village of the Micmac Indians was located at Shubenacadie and they had a primitive type of agriculture that consisted principally of growing small quantities of corn and wheat. The first real agricultural development began with the settlement of the French in the early part of the eighteenth century. Windsor was settled in 1703 and there were other settlements along the shore at Noel and Noel Shore. These early settlers erected dykes on the tidal marshes along the Avon estuary and grew crops on the fertile soil.

After the expulsion of the Acadians in 1755, the areas were settled by Loyalists families from the United States, immigrants from the British Isles and Europe, and by families of military personnel stationed in the district. Falmouth was settled in 1760 by pioneers from Connecticut, who found the soil fertile enough to meet all their needs. Six hundred tons of hay were cut in that year from former Acadian farms. Noel was settled in 1762 by people from Ireland. Maitland received its name in 1828. It became an important ship-building centre and the largest wooden ship ever built in Canada was built there. There was good farm land in this area and the forests contained valuable timber, so that it soon became a prosperous community. A railway was built connecting it with Windsor and later with Truro. The area around Kempt Shore and Burlington was settled by officers of the Royal Navy and their families, and the many rivers and creeks were a refuge for privateers during the American Revolution.

The principal agricultural activity in the early days seems to have centred around Windsor, where an agricultural society was formed in July, 1790. The first agricultural fair in Canada was held here in 1764 and this has been held annually since 1815 and is believed to be the oldest agricultural fair in America.

The crops introduced by the Acadians included wheat, barley, rye, oats, hemp, peas, cabbage, and flax and the early American and British settlers were fortunate in finding cleared and fertile land and crops already established. Apple trees were introduced into the Minas Basin area about 1633. The settlers continued to cultivate the crops and to make improvements in equipment and methods. Mills for grinding grain were established and roads between important points were built. During the war of 1812 military contracts for beef, pork and hay made grazing profitable and farmers began to neglect the tillage of the land and care of the soil. This neglect continued until about 1818 when, encouraged by the writings of "Agricola," a renewed interest was taken in agriculture. Seed and livestock were imported and the formation of agricultural societies began.

At the present time about 38 per cent of Hants county is occupied by a total of 2,025 farms. The average size of a farm is 147 acres, but about 26 per cent of the farms are 100 to 200 acres and 20 per cent 50 to 100 acres in size. Only 11 per cent of the farms exceed 200 acres. The largest farms occur in the vicinity of Noel, Shubenacadie, South Newport, and Maitland; but there are large farms in all districts. Improved land averages about 32 acres per farm, field crops 24 acres, woodland 86 acres and pasture 5 acres. This varies widely on individual farms. The greatest percentage of improved land occurs in the Falmouth district, where 45 per cent of the occupied land is improved. The Martock and Shubenacadie districts have 38

and 25 per cent, respectively, of the occupied land improved. The average improved acreage per farm varies from 51 acres in the Rawdon district, 47 acres in Nine Mile River, 43 acres in Shubenacadie, 39 acres in Falmouth, and 38 acres in Martock district, to 10 acres per farm in the vicinity of Windsor Forks.

A table showing the area and condition of farm land in Hants county is given below:

TABLE VII—AREA AND CONDITION OF LAND IN HANTS COUNTY—1941

Total land area	786,560 acres	*Unimproved land:*	232,299 acres
Total occupied land	298,817 acres	Woodland	174,849 acres
Improved:	66,518 acres	Natural pasture	51,591 acres
Field crops	43,677 acres	Marsh or wasteland	5,859 acres
Pasture	11,227 acres	Number of farms	2,025
Other crops	6,614 acres	Average area per farm	147 acres
		Average improved area per farm	32 acres

The principal field crops grown in the county are hay, oats, barley, potatoes and mixed grain. Smaller acreages of roots and wheat are also grown. In the early days wheat was one of the important crops, but with the opening of the prairies and large-scale wheat production in the west, wheat growing as a source of flour for human consumption became unprofitable.

About 90 per cent of the present field crop acreage is occupied by hay and oats. In recent years the acreages of these crops has increased slightly Practically no wheat is now grown in the county, except for small local acreages and the acreage of barley has declined sharply. Increased acreages of potatoes, roots, and mixed grain are evident. Hants county ranks about fifth in the province in area of field crops, and fourth in the production of hay. The acreages of the principal field crops in Hants county are given in Table VIII.

TABLE VIII—ACREAGE OF FIELD CROPS IN HANTS COUNTY—1941 and 1947

	1941	1947
Hay	38,644 acres	39,700 acres
Oats	6,036 acres	6,500 acres
Barley	908 acres	460 acres
Potatoes	1,100 acres	1,600 acres
Roots	863 acres	1,020 acres
Mixed grain	630 acres	1,640 acres
Wheat	74 acres	10 acres

The greatest acreages of field crops occur in the vicinity of Shubenacadie and South Newport. One of the important agricultural activities in Hants county is orcharding and small orchards are also found on individual farms where other forms of agriculture are carried on. In 1940 there were 133,000 apple trees in Hants county used for commercial production and about 90 per cent of these were over ten years old. Other fruits include pears, plums, and cherries. The principal orchard areas occur around Falmouth, Martock, Windsor Forks, and Scotch Village.

Excellent herds of fine cattle are found in Hants county and dairying is one of the main enterprises. The production of milk centres around Shubenacadie, Noel, Martock, South Newport, Falmouth, and Maitland and the value of dairy products in 1941 was nearly $700,000. Hants county ranks third in the volume of milk production in the province. The livestock population in Hants county is given in Table IX.

TABLE IX—LIVESTOCK POPULATION IN HANTS COUNTY—1941 and 1947

	1941	1947
Horses	2,934	2,742
Cattle	15,772	14,950
Milk cows	11,818	———
Sheep	4,468	3,325
Swine	3,344	3,960
Poultry	86,967	194,000

The raising of poultry increased greatly during the war years and continues to increase at present. The decrease in the number of horses is being offset to some extent by tractor power. About 140 farms reported tractors and about 800 farms reported automobiles or tractors in 1941.

The value of forest products in Hants county in 1941 was $234,837 of which about one-third was used on the farm. Forest products consist of pulpwood, firewood, logs for lumber, pit props, and railway ties.

On 36 per cent of the farms in Hants county more than half of the farm products are used directly on the farm. On farms where more than 50 per cent of the revenue is obtained from the sale of farm products, mixed farming is the leading occupation, followed by dairying, part-time farming (fishing-farming or lumbering-farming), fruit production, lumbering, and hay farming.

In Hants county nearly 90 per cent of the farms are owner-operated and the value of all farms in 1941 was estimated at $7,217,322. The value of farm products in the same year was $2,340,104 of which 36 per cent came from field crops, 39 per cent from animal products, 10 per cent from forest products and about 7 per cent from tree fruits.

There are approximately 85 abandoned farms in Hants county occupying a total of 11,130 acres.

Land Use and Management of Hants County Soils

About 35 per cent of Hants county may be considered as unsuitable for agricultural purposes and another 25 per cent is only partly useful due to stoniness, topography, or shallowness over bedrock. Since 38 per cent of Hants county is occupied by farms, it would appear that most of the available farm land is now occupied. A variety of farming activities are carried on in Hants county. Mixed farming, dairying, fruit growing, and a combination of fishing-farming or lumbering-farming are the major types of activity. The crops grown and type of rotation vary widely in different districts depending on the type of farming, the suitability of the soil, and economic conditions.

In Hants county, practically all farms keep some cows and livestock and hay and grain occupy the largest acreages of cleared land. A considerable acreage is planted to orchard. Other field crops include potatoes, roots, and mixed grain. The length and type of rotation vary widely throughout the county. Generally, sod land is plowed and sown to grain. This may be followed by a root crop and then seeded down with grain and remain in hay or pasture for several years. Usually no roots are grown on the dykeland areas, which remain in hay for many years. Lime is applied to sod land before plowing and fertilizers may be used when grain is seeded down. Practices

differ with the type of farming and the individual area. The soils best suited to agriculture are found on the lowland plain, and with a few exceptions all crops common to the area may be grown on these soils, but some soils are better suited to some crops than others. The soils of the Queens catena occupy more than half of the lowland area and a large proportion of the farm land is made up of these soils. The Queens soils are fine textured and require careful handling. The well-drained Falmouth soils are used for orchard and are also suitable for dairy farming. Hay, oats, and roots are the main crops grown and occasionally corn is grown for green fodder. Orchards are generally under sod culture. The soils of the imperfectly drained Queens series are used principally for hay, grain, or pasture, while the poorly drained areas are unsuitable for agriculture and are mostly in forest.

The soils of the Queens catena are acid throughout and lime is required to produce a successful crop of clover. They must be plowed when the moisture content is right or a puddled condition results. Cultivation and tillage practices on these soils are very important and wide differences in yields can result from poor preparation of a seedbed. The soils also require a good supply of organic matter, either in the form of manure or green manuring crops.

A four- or five-year rotation is desirable. Lime may be applied at the rate of 2 tons per acre and harrowed in thoroughly when the land is plowed for grain. Commercial fertilizers are applied to the grain crop. In general, these soils are better suited to hay and grain than the other soils of the area and they also make good permanent pasture. Legumes grow well where lime is applied and drainage is satisfactory, as on the Falmouth soils, but often winterkilling or frost heaving depletes the stand.

The soils of the Hantsport catena are also fine textured and are similar to the Queens soils in their adaptation to crops and soil management, except that they are not so well suited to orchard. The maintenance of organic matter, the use of lime, shorter rotations, and the use of fertilizers are required to produce good crop yields. Drainage is an important factor in both of these soil catenas. Hay and grain are the main crops on the Hantsport soils. The only other fine-textured soils in the area are those of the Elmsdale catena, which occur on the upland plain. The well-drained soils are suitable for hay and grain, similar to the Queens and Hantsport soils, but large areas of the Elmsdale soils are stony or shallow and no extensive areas are cleared. Some of the stonier areas are better adapted to permanent pasture, which may be fertilized and made to produce good feed for cattle. Poorly drained areas are unsuitable for agricultural purposes.

The coarser-textured soils of the lowlands include the Pugwash, Truro, and Hansford catenas. The Pugwash and Truro soils are adapted to all crops grown in the area and are especially suitable for the growing of vegetables and canning crops. They are generally not so well suited to hay and grain as the heavier soils, although good yields of these crops are obtained. As with the heavier soils, the maintenance of organic matter is even more important in the Pugwash and Truro soils and the use of lime and commercial fertilizers is necessary for best results. At present, dairy farming and the growing of some potatoes are the chief activities on these soils. If a suitable market becomes available, canning-crop production may utilize a considerable acreage of the Truro and Pugwash soils. The Truro soils are perhaps more suitable for this enterprise, because of their topography. The Pugwash soils are easily eroded and much of the area has considerable slope, so that only the smoother areas are suitable for canning crops. The Pugwash and Truro soils have shown good response to treatment with commercial fertilizers.

The soils of the Hansford catena are not cultivated to any extent. They tend to be stony and, in some cases, crops may suffer from lack of moisture in a dry year. Small areas are planted to hay or grain, but yields are generally low. Pastures are generally poor and weedy, but their carrying capacity could be increased by fertilization.

The soils of the Stewiacke and Acadia catenas are among the most productive in the surveyed area. They were the first soils to be cultivated. They are free from stone, relatively fertile and suitable for most crops grown in the area. These soils are fine textured and the major problem connected with their use is drainage. The Stewiacke soils are often subject to flooding while most of the Acadia soils are dyked against this condition, but their internal drainage is generally slow. Their principal use at present is for hay and grain or pasture.

The Stewiacke soils are suitable for vegetable crops or roots, but the danger of flooding usually prevents the use of these soils for this purpose. Often flooding occurs over large areas of normally well-drained land, so that hay or pasture has tended to become the main use of these soils. The Acadia soils require open ditches for successful drainage and failure to maintain these often lowers the productivity of the land. Both the Stewiacke and Acadia soils are benefited by applications of organic matter and by liming.

The other water-deposited soils include the Hebert, Torbrook, Cornwallis, and Cumberland catenas.

The Cumberland soils are not used extensively for agricultural purposes. Individual areas on any farm are small and their chief use is for hay and pasture. They are subject to intermittent flooding. The Cornwallis, Hebert, and Torbrook soils are very open and tend to be droughty and in some places the Torbrook soils are stony. Where these soils contain enough fine material to give them some moisture-holding capacity, they are often suitable for cash crops and small fruits. Some of the Torbrook soils have been used for orchard. All of these soils are heavily leached and acid throughout. Where crops are grown it is necessary to neutralize this acidity by liming and the soils require considerable organic matter to improve their moisture-holding capacity and improve their tilth. Due to the porous nature of these soils, fertilizer applications are readily washed from the soil by percolating water and for this reason commercial production of crops is often a hazardous undertaking. Good soil management is required for profitable production.

The soils of the Rawdon, Halifax, and Gibraltar catenas are found on the upland plain. The Gibraltar soils and a major proportion of the Rawdon and Halifax soils are too stony or shallow to be suitable for agricultural purposes. Several large areas of the Rawdon soils have been cleared, but are now reverting to forest or grazing lands. The cultivated areas are mostly in hay, but the stands are thin and this also applies to the Halifax soils. Natural fertility of these soils is low and they are best suited to forest. Some of the smoother areas might be suitable for pasture, if properly fertilized and managed, but most farmers on these soils keep only a few cattle and lumbering is the major occupation.

Some hay is cut from the salt marshes in the lowland areas, but this consists of natural grasses and sedges.

Practically all of the soils that are being farmed in Hants county are capable of being built up and maintained in a fairly productive state. Climatic conditions, especially along the north shore area, result in late seeding which lowers crop productivity. The general requirements for maximum production apply to all soils in the area—the maintenance of organic matter, the use of lime and fertilizers and a shortened rotation; in some cases all are necessary. Fertilizer recommendations for the different soils and crops of the area are

published annually by the Maritime Fertilizer Council and are available to the farmer. The management of pasture lands could be improved. Applications of fertilizers, preferably in the fall, would greatly increase their carrying capacity. Care should be taken that the pastures are well grazed, but not over-grazed. The value of pasture as a source of feed and the importance of a profitable investment of fertilizer materials have scarcely been recognized.

Land Use Capability and Productivity Rating

The soils of Hants county have been grouped according to their suitability for agricultural purposes. This grouping is based on characteristics of the soils themselves and does not take into account such economic factors as distance from market, prices of farm products, or land values in any area, so that the rating does not indicate any financial value of the soil.

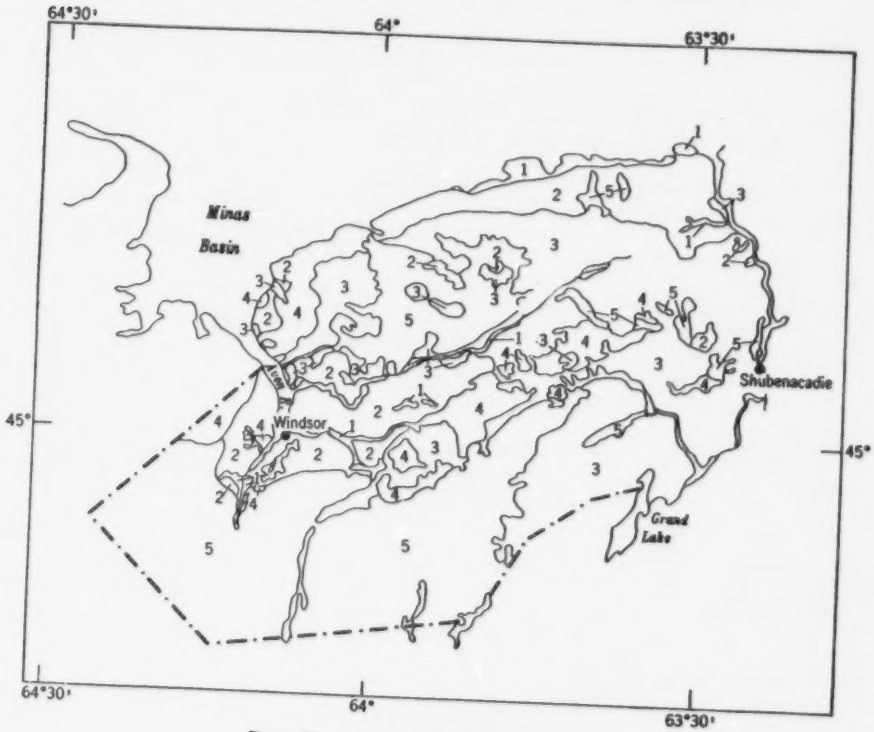


Figure 11 Land Use Capability in Hants County

Class 1. Good crop land

Class 2. Fair to good crop land

Class 3. Fair crop land

Class 4. Fair to poor crop land

Class 5. Poor crop land

The most practical and accurate method of rating soils is one based on a knowledge of crop yields over a considerable period of time, but such figures are not available for most of the soils in Hants county. Consequently, field observation and soil properties such as natural fertility, ease of tillage, drainage, topography, stoniness, and ease of erosion form the base of the classification.

Crop yields on any particular soil vary with management. Frequently a poor soil with good management will produce yields equal to those on a good soil with poor management. Some soils are especially adapted to certain crops, but may not rate so highly for general purposes. Certain soils with a high rating may contain small areas that are better or poorer than the average, but are too small to be mapped out on the scale used in mapping.

In Hants county, drainage is an important factor affecting the use of the soil; and frequently differences in crop yields on the same soil are due to artificial drainage differences alone. In general, the fine-textured soils are most suitable for hay, grain, and pasture, while the coarser-textured soils are more favorable for hoed crops. The very stony areas and shallow soils are best suited to forest, since this is the crop most economically produced on them. Poorly drained areas are unsuitable for agricultural purposes. In Table X the soils of Hants county are grouped according to suitability for use, and their value for several crops is given. In the absence of yield data, they have been rated as excellent, good, fair, poor, or unsuitable.

TABLE X—LAND USE CAPABILITY OF HANTS COUNTY SOILS

Soil Catena	Hay	Grain	Potatoes	Roots	Vegetable crops	Pasture
Class I—Good Crop Land—						
Stewiacke (well drained)	E	G	G	G	G	E
Cumberland (well drained)	G	G	G	FG	FG	FG
Truro (well drained)	E	G	E	G	E	G
Class II—Fair to Good Crop Land—						
Acadia (imperfectly drained)	E	G	P	P	P	FG
Pugwash (well drained)	G	G	G	G	G	F
Queens (well drained)	E	G	F	F	FP	E
Hantsport (well drained)	G	G	F	F	FP	G
Class III—Fair Crop Land—						
Queens (imperfectly drained)	G	G	P	FP	P	E
Elmsdale (well and imperfectly drained)	G	G	FP	FP	F	G
Hansford (well drained)	F	F	F	FP	FP	FP
Class IV—Fair to Poor Crop Land—						
Rawdon	F	F	FG	FP	FP	F
Hantsport (imperfectly drained)	G	F	P	P	P	FP
Hebert	P	P	FG	P	F	P
Torbrook	P	P	FG	P	FP	P
Cornwallis	P	P	G	P	FG	P
Class V—Poor Crop Land—						
Halifax	U	U	U	U	U	FP
Gibraltar	U	U	U	U	U	U
Poorly drained members of Queens, Hantsport, Elmsdale, Rawdon, Hansford, Halifax, Cumberland, Stewiacke, Acadia, Swamp			Generally unsuitable			

E=excellent G=good FG=fair to good F=fair P=poor U=unsuitable FP=fair to poor

Land Use Class I

	Acres	Percentage of total
Stewiacke (well drained)	6,656·0	0·85
Cumberland "	5,868·8	0·75
Truro "	6,252·8	0·79
	18,777·6	2·39

The soils in this class are rated as good crop land. Their ease of cultivation, freedom from stone, and good drainage enable crops to be grown on these soils more economically than on other soils of the area. The Stewiacke and Cumberland soils are subject to flooding, but are usually free from this hazard during the growing season. They are more suitable for hoed crops than the finer-textured soils, although they will produce good yields of all crops grown in the area under good management. They all respond well to fertilization and require organic matter and lime to give best results. The Truro soils erode fairly easily and care must be taken when hoed crops are grown on a slope.

Land Use Class II

	Acres	Percentage of total
Acadia (imperfectly drained)	4,697·6	0·59
Queens (well drained)	79,014·4	10·04
Pugwash (well drained)	15,148·8	1·93
Hantsport (well drained)	38,745·6	4·93
	137,606·4	17·49

These soils make good to fair crop land. Differences in drainage, topography, and ease of cultivation make them slightly less suitable than the soils in Class I. For certain crops some of these soils produce yields better than those on the soils in Class I. The Acadia soils are probably the best hay and pasture soils in the county and their ease of cultivation and freedom from stone make them very valuable as agricultural soils, but generally drainage limits the variety of crops that can be grown. The Pugwash soils are coarser-textured and better suited to cash crops. In some places they may be equal to the Truro soils, but in Hants county their topography often limits their full use. The Queens and Hantsport soils are suitable for most crops grown in the area. They require careful handling. All of the soils are acid and require liming. Maintenance of organic matter is also an important soil management factor.

Land Use Class III

	Acres	Percentage of total
Queens (imperfectly drained)	107,769·6	13·70
Elmsdale (well and imperfectly drained)	72,160·0	9·18
Hansford (well drained)	56,678·4	7·21
	236,608·0	30·09

These soils are classed as fair crop land. The Queens soils in this class probably occur on more farms in Hants county than any other soil. Hay and grain crops on the Queens soils are probably equal to any on the soils in Class II, but the soils are not generally suitable for other crops. They are usually late to work in the spring and require very careful handling. The Elmsdale and Hansford soils are often limited in use by topography and stoniness. Large areas of the Hansford and Elmsdale soils have sufficient stone to interfere with cultivation and the major proportion of these soils is still under forest. In a few places, under good management, the Queens soils

produce hay and grain yields equal to those on any soil in the county. Considerable attention to the preparation of this soil for crops is necessary for maximum yields.

All of the soils in this class occupy slopes that are subject to erosion and care must be exercised in cultivating the steeper slopes. Like most of the soils in the county, the maintenance of organic matter, liming, and the use of fertilizers are necessary to maintain fertility.

LAND USE CLASS IV

	Acres	Percentage of total
Rawdon	36,140·8	4·59
Hantsport (imperfectly drained)	18,502·4	2·36
Hebert	8,640·0	1·10
Torbrook	2,969·6	0·38
Cornwallis	480·0	0·06
	66,732·8	8·49

The soils in this class are rated as fair to poor crop land. The characteristics that place the soils in this class are either rough topography, stoniness, slow or excessive drainage, low natural fertility, or a combination of these. The Rawdon soils are generally shallow and occupy long slopes where considerable sheet erosion takes place. Poor drainage and topography usually make the Hantsport soils limited in use. Some areas are equal to the Queens soils in crop value, but such areas are small. The Hebert, Cornwallis, and Torbrook soils, while easily cultivated and not generally stony, tend to be droughty. Where these soils contain enough fine materials to hold sufficient moisture or where organic matter is maintained, they are suitable for cash crops and market garden purposes. For this purpose they require very careful management to be profitable. The coarser-textured areas of these soils are best suited to the growing of trees. In general, the soils of this class are best suited to a combination of agriculture, forestry, and grazing.

LAND USE CLASS V

	Acres	*Percentage of total*
Halifax (well drained)	44,064·0	5·60
Gibraltar (well drained)	171,680·0	21·83
Queens (poorly drained)	52,992·0	6·74
Hantsport (poorly drained)	3,481·6	0·44
Elmsdale (poorly drained)	384·0	0·04
Rawdon (poorly drained	1,484·8	0·19
Hansford (poorly drained)	4,953·6	0·63
Halifax (poorly drained)	454·4	0·06
Cumberland (poorly drained)	953·6	0·12
Stewiacke (poorly drained)	2,412·8	0·30
Acadia (poorly drained)	2,521·6	0·32
Swamp and peat	14,457·6	1·84
	299,840·0	38·11

These soils are classified as poor crop land. Poor drainage and stoniness are the principal factors limiting their use. Some of the poorly drained areas of the Stewiacke, Cumberland, Acadia, and Queens soils have potential possibilities if drainage were established, but at present this would probably not be profitable. The Halifax and Gibraltar soils have only very small areas that are suitable for cultivation, and are best suited to forest. Most of the area occupied by the Halifax and Gibraltar soils will never be suitable for agricultural purposes. The areas of swamp are useless at present and will likely remain in this condition.

DISCUSSION OF ANALYTICAL DATA

The physical and chemical composition of some of the major soil catenas in Hants county are given in Table XI (*a*). This data, if used with caution and in conjunction with the information contained in the body of the report with regard to topography, drainage, stoniness, etc., can be useful in evaluating the soil of any given catena or member of that catena.

It should be borne in mind that the values given were obtained through analysis of only one representative soil profile of any series of a catena and these values are subject to change over a limited range, depending on a number of interrelated factors, one of the more important of which is the type of forest vegetation under which the soil was developed.

Reaction:

The soils are all extremely acid in reaction throughout the profile and applications of lime should be considered a necessity in the growing of most crops on these soils. Very acid soils contain soluble iron, aluminum and manganese in quantities large enough to be toxic to many of our most important field crops. Neutralization of this acidity in the soil, by liming, removes these toxic elements from solution. Removal of these substances from the soil solution also creates a condition in the soil whereby more of the phosphate applied as fertilizer is available for plant use. Nitrogen fixing bacteria do not thrive in a soil of low pH. Legumes in particular, which require large amounts of calcium, require a moderately high pH for best growth.

Nitrogen:

A very large proportion of the total nitrogen content of the soils is in the highly organic surface horizon. This is particularly true of the Queens, Hantsport, and Pugwash catenas. In the Rawdon, Gibraltar, Halifax, and Hansford catenas a significant movement of organic material down to the B horizon is reflected in an increased nitrogen content in this horizon.

The presence in these soils of large amounts of potentially available nitrogen in the surface horizon does not mean that the soils can be cultivated indefinitely without applications of nitrogen-carrying fertilizers. Under cultivation this supply of nitrogen-carrying humus is rapidly depleted and, generally speaking, nitrogen applications are necessary for sustained crop production. Proper conservation and use of barnyard manures and growth of leguminous crops can do much to reduce the amount of nitrogen that must be added as commercial fertilizer to meet the needs of the crop and maintain the soil fertility.

Phosphorus:

The soils of Hants county are, as a whole, low in phosphorus content. As with nitrogen, the relatively large amount of phosphorus tied up in the organic horizon becomes available to the plant when the organic matter is decomposed. The present state of available phosphorus is low, as shown by the results in Table XI (*b*) and these data indicate that all of the soils require applications of phosphorus-carrying fertilizers to meet the needs of the crop. In addition to this, it should be remembered that a relatively large proportion of the phosphorus applied to Nova Scotia soils is fixed in an unavailable form, so proportionately larger applications of this nutrient element are necessary than would otherwise be required.

Potassium:

The available potassium content of all the soils, with the exception of Acadia, is low. However, the available potash content of a soil is no longer believed to be a good criterion of the amount of potash available to the plant, since crops have been shown to extract far larger amounts from some soils than can be accounted for if only the available form is taken into consideration.

Calcium:

Soils of the Queens, Hantsport, Pugwash, and Acadia catenas contain the most available calcium. Gibraltar contains a smaller amount, and Rawdon, Halifax, and Hansford soils contain a relatively low supply, particularly in the B_2 and C horizons.

Magnesium:

As with calcium, the largest total available magnesium content is found in the Queens, Hantsport, Pugwash, and Acadia catenas. The available magnesium content is considerably lower than the available calcium in these soils. Rawdon, Gibraltar, Halifax, and Hansford, the coarse-textured soils, have a relatively low available magnesium content.

TABLE XI(a)—CHEMICAL AND PHYSICAL ANALYSIS OF REPRESENTATIVE SOIL SAMPLES

Horizon	Depth in inches	CHEMICAL ANALYSIS: Loss on Ignition %	pH	Lime Req. $CaCO_3$ Tons/Acre	Total N %	Total P_2O_5 %	Total SiO_2 %	Total R_2O_3 %	Total CaO %	Total MgO %	Exchangeable Bases m.e./100 gm. soil: H	Ca	Mg	K	PHYSICAL ANALYSIS: % Gravel	Very coarse sand 2-1mm%	Sand 1-·05 mm %	Silt ·05-·002 mm %	Clay below ·002mm %
Queens Catena (PH)—																			
A_0	0–3½	64·84	3·4	30·5	1·28	0·171	22·66	6·11	0·258	0·266	79·1	4·30	1·90	0·283					
A_2	3½–9	3·95	4·1	6·3	0·039	0·004	80·36	13·89	0·121	0·306	10·5	0·12	0·10	0·033	12·3	2·5	31·6	47·0	18·4
B_1	9–13	4·93	4·2	6·7	0·093	0·016	73·45	18·70	0·094	0·457	10·3	0·18	0·12	0·027	5·9	3·7	31·8	37·0	27·5
B_2	13–17	4·60	4·6	5·3	0·056	0·034	68·53	25·11	0·086	0·383	7·4	0·42	0·22	0·057	3·8	1·9	28·6	34·5	35·0
C	17–	4·43	5·0	1·0	0·048	0·043	61·43	31·04	0·172	0·336	2·5	4·06	1·36	0·110	1·7	2·8	22·5	36·5	38·2
Queens Catena (P)—																			
A_0	0–2½	54·43	3·8	23·1	0·994	0·109	35·91	2·42	0·628	0·147	47·2	12·75	1·50	0·726	0·4	0·7			
A_2	2½–4	3·66	3·6	5·6	0·085	0·009	87·85	6·66	0·112	0·036	7·0	0·38	0·14	0·107	6·2	1·8	53·4	38·5	6·3
B_1	4–14	5·67	4·7	4·9	0·105	0·029	72·96	15·64	0·172	0·296	8·8	0·68	0·20	0·080	19·7	4·0	47·3	34·9	13·8
B_2	14–24	3·07	4·8	3·5	0·026	0·015	74·31	17·74	0·181	0·577	6·0	0·56	0·18	0·060	6·2	1·8	50·7	27·5	20·0
C	24+	3·14	4·6	3·5	0·026	0·036	73·54	20·14	0·129	0·427	4·6	3·00	0·52	0·121	8·1	2·2	44·2	25·8	27·8
Huntsport Catena (P)—																			
A_0	0–3	76·62	3·2	27·0	1·038	0·258	13·39	5·95	0·112	0·266	97·0	2·00	1·60	0·577	0·0	0·3			
A_2	3–9	5·28	4·0	7·8	0·079	0·039	78·50	13·86	0·180	0·146	13·3	0·16	0·14	0·047	3·1	1·4	29·2	49·9	19·7
B_1	9–14	3·56	4·4	3·9	0·045	0·036	77·67	16·12	0·077	0·221	6·4	0·24	0·14	0·043	17·2	4·1	44·7	34·3	16·5
B_2	14–20	4·25	4·8	3·5	0·051	0·029	70·72	24·13	0·094	0·326	6·1	1·84	0·46	0·047	18·6	6·1	39·4	31·0	23·5
C	20+	4·65	4·9	1·7	0·048	0·054	66·35	30·98	0·155	0·336	5·4	4·92	0·98	0·134	22·1	7·2	31·4	32·1	29·3
Rawdon Catena (P)—																			
A_0	0–2	58·54	3·6	28·4	0·932	0·153	30·43	7·48	0·456	0·256	48·4	7·90	1·60	0·167	4·8	2·2			
A_2	2–4	3·29	3·4	6·7	0·059	0·011	79·14	15·28	0·034	0·042	8·1	0·140	0·08	0·043	10·1	4·1	25·7	57·5	12·7
B_1	4–12	14·24	4·7	5·3	0·276	0·095	51·22	32·70	0·043	0·837	13·8	0·10	0·06	0·048	18·7	9·8	30·8	44·9	14·5
B_2	12–23	4·90	5·0	2·1	0·059	0·049	65·29	30·67	0·030	0·487	5·0	0·06	0·08	0·030	24·8	7·6	32·5	42·1	17·8
C	23+	3·91	4·9	1·7	0·043	0·056	67·58	21·18	0·043	0·528	3·6	0·06	0·06	0·027	19·4	7·0	32·7	47·2	13·1
Gibraltar Catena (P)—																			
A_0	0–2	62·10	3·0	32·0	1·052	0·153	25·83	4·76	0·490	0·106	77·7	8·70	2·30	0·234	2·7	2·7			
A_2	2–4	1·55	3·3	2·8	0·048	0·025	88·18	7·24	0·155	0·010	4·9	0·54	0·14	0·047	10·4	6·3	48·9	38·8	6·0
B_1	4–17	10·32	4·3	5·3	0·165	0·131	66·38	21·31	0·146	0·356	13·8	0·70	0·26	0·150	20·6	12·3	46·7	30·8	10·2
B_2	17–24	5·13	4·2	3·1	0·071	0·054	75·06	21·22	0·129	0·628	8·2	0·30	0·16	0·094	25·4	6·7	45·9	33·4	14·0
C	24–	3·68	4·3	2·4	0·031	0·061	71·43	18·61	0·180	0·473	6·3	0·48	0·28	0·077	18·6	8·2	51·8	31·0	9·0

TABLE XI(a)—CHEMICAL AND PHYSICAL ANALYSIS OF REPRESENTATIVE SOIL SAMPLES—*Continued*

Horizon	Depth in inches	CHEMICAL ANALYSIS													PHYSICAL ANALYSIS				
		Loss on Ignition %	pH	Lime Req. $CaCO_3$ Tons/Acre	Total N %	Total P_2O_5 %	Total SiO_2 %	Total R_2O_3 %	Total CaO %	Total MgO %	Exchangeable Bases m.e./100 gm. soil				% Gravel	Very coarse sand 2-1mm%	Sand 1-·05 mm %	Silt ·05-·002 mm %	Clay below ·002mm %
											H	Ca	Mg	K					
Halifax Catena (P)—																			
A_0	0-2	45·82	3·4	16·0	0·978	0·159	42·87	8·88	0·447	0·266	45·5	6·80	1·60	0·368	1·6	1·2	.	.	.
A_2	2-5	4·93	3·1	7·8	0·106	0·025	78·11	12·82	0·112	0·146	12·6	0·32	0·26	0·097	6·2	3·8	31·9	56·6	7·7
B_1	5-15	10·31	4·5	7·4	0·151	0·050	62·75	24·61	0·095	0·266	17·8	0·10	0·10	0·02	5·3	4·7	31·3	57·5	6·5
B_2	15-23	8·87	5·1	2·8	0·122	0·073	61·79	29·26	0·120	0·417	9·5	0·10	0·06	0·044	21·2	2·0	33·4	57·0	7·6
C	23+	4·06	5·1	2·4	0·059	0·063	67·63	28·51	0·163	0·628	6·1	0·12	0·08	0·034	16·0	7·5	37·0	51·9	8·6
Hansford Catena (P)—																			
A_0	0-3	74·00	3·9	22·7	1·250	0·226	18·38	4·23	0·455	0·196	62·6	9·2	2·00	0·248	0·6	0·7	.	.	.
A_2	3-9	8·88	3·6	9·8	0·123	0·034	75·33	11·12	0·094	0·026	14·7	0·36	0·28	0·040	18·2	5·3	33·1	50·9	10·7
B_1	9-14	9·60	4·3	7·8	0·164	0·040	71·72	16·73	0·121	0·181	17·0	0·28	0·10	0·033	20·1	3·8	33·9	53·3	9·0
B_2	14-20	4·98	4·8	2·8	0·056	0·043	77·78	13·41	0·112	0·186	6·3	0·08	0·04	0·027	27·7	7·2	40·8	43·1	8·9
C	20+	4·76	4·9	2·4	0·043	0·028	77·98	16·94	0·121	0·191	5·8	0·08	0·02	0·057	42·3	7·0	44·6	39·5	8·9
Pugwash Catena (P)—																			
A_0	0-2	64·65	3·8	26·4	1·164	0·233	24·15	3·36	0·602	0·237	63·4	13·10	2·50	0·347	0·1	0·6	.	.	.
A_2	2-6	5·34	3·3	8·4	0·043	0·029	83·39	7·46	0·285	0·150	12·3	0·20	0·12	0·033	6·3	4·5	61·5	27·9	6·1
B_1	6-13	2·60	4·9	2·4	0·044	0·009	82·59	11·45	0·215	0·402	4·7	1·14	0·92	0·033	13·0	6·9	64·7	23·8	4·6
B_2	13-19	2·19	4·9	2·4	0·024	0·005	80·84	12·53	0·224	0·422	4·5	1·48	0·24	0·047	11·6	3·1	60·8	23·7	12·4
C	19+	2·43	4·8	1·7	0·017	0·030	77·58	14·85	0·310	0·557	3·2	4·04	1·04	0·060	13·8	7·2	57·2	21·1	14·5
Acadia Catena—																			
A	0-6	6·14	4·4	4·2	0·164	0·024	67·99	21·52	0·860	0·909	6·8	4·02	2·64	0·211	0·2	0·3	17·1	61·8	20·8
B	6-23	4·99	3·8	5·6	0·101	0·026	66·75	22·89	0·570	1·050	9·6	2·28	2·28	0·348	0·0	0·5	9·1	61·2	29·2
C	23+	6·14	3·5	6·7	0·119	0·126	62·01	26·83	0·421	0·387	11·6	1·04	1·54	0·360	0·0	0·0	15·6	53·0	31·9

TABLE XI(b)—AVAILABLE NUTRIENTS IN LB. PER ACRE

Catena	Horizon	Depth "	Ca	Mg	K	P
Queens PH	A_0	0–3½	165·9	43·9	21·5	5·0
	A_2	3½–9	48·0	24·0	25·7	8·0
	B_1	9–13	72·0	28·8	21·1	2·0
	B_2	13–17	168·0	52·8	44·5	6·0
	C	17 +	1,624·0	326·4	85·8	4·0
Queens P	A_0	0–2½	492·1	34·7	55·2	18·2
	A_2	2½–4	152·0	33·6	83·4	12·0
	B_1	4–14	272·0	48·0	62·4	10·0
	B_2	14–24	224·0	43·2	46·8	10·0
	C	24 +	1,200·0	124·8	94·4	16·0
Hantsport P	A_0	0–3	77·7	37·0	43·9	6·0
	A_2	3–9	64·0	33·6	36·7	6·0
	B_1	9–14	96·0	33·6	33·5	8·0
	B_2	14–20	736·0	110·4	36·7	4·0
	C	20 +	1,968·0	235·2	104·5	15·0
Rawdon P	A_0	0–2	304·9	37·0	12·7	11·6
	A_2	2–4	56·0	19·2	33·5	6·0
	B_1	4–12	40·0	14·4	37·4	8·0
	B_2	12–23	2·4	19·2	23·4	4·0
	C	23 +	2·4 T	14·4	21·1	18·0
Gibraltar P	A_0	0–2	335·8	53·1	17·8	11·0
	A_2	2–4	216·0	33·6	36·7	8·0
	B_1	4–17	280·0	62·4	117·0	12·0
	B_2	17–24	120·0	38·4	73·3	2·0
	C	24 +	192·0	67·2	60·1	16·0
Halifax	A_0	0–2	262·5	37·0	28·0	8·0
	A_2	2–5	128·0	62·4	75·7	14·0
	B_1	5–15	40·0	24·0	15·6	2·0
	B_2	15–23	40·0	14·4	34·3	4·0
	C	23 +	48·0	19·2	26·5	12·0
Hansford P	A_0	0–3	355·0	46·2	18·8	14·6
	A_2	3–9	144·0	67·2	31·2	10·0
	B_1	9–14	112·0	24·0	25·7	8·0
	B_2	14–20	3·2	9·6	21·1	6·0
	C	20 +	3·2	4·8	44·5	4·0
Pugwash P	A_0	0–2	505·7	57·8	26·4	12·6
	A_2	2–6	80·0	28·8	25·7	14·0
	B_1	6–13	456·0	220·8	25·7	8·0
	B_2	13–19	592·0	57·6	36·7	10·0
	C	19 +	1,616·0	249·6	46·8	24·0
Acadia	A	0–6	1,608·0	633·6	122·4	72·0
	B	6–23	912·0	571·2	201·8	11·0
	C	23 +	416·0	369·6	208·8	22·0

SUMMARY

Hants county occupies a central position in the peninsula of Nova Scotia and has a total area of 1,229 square miles or 786,560 acres. The greatest distance from east to west is 52 miles and from north to south about 34 miles. Windsor, the principal town, is about 45 miles from Halifax.

The relief of Hants county is largely determined by the nature of the underlying rock formations. These formations divide the county into two broad physiographic divisions—a lowland and an upland plain. The lowland plain is underlain by sedimentary rocks of the Carboniferous age and the upland plain by metamorphic and igneous rocks of Pre-Cambrian age. During the Pleistocene, the whole area was covered with glacial ice, which ground up the underlying rock and mixed and redeposited it as till or outwash material over the surface of the county. The depth of this drift material is variable and may range from a few inches to several feet. The nature of the local topography is often dependent on the depth and method of deposition of the drift. The topography of the lowland plain varies from gently undulating to strongly rolling with elevations ranging from 25 to 350 feet. The upland plain is more hilly and has an elevation ranging from 350 to 650 feet.

The county is drained by several large rivers whose tributaries provide adequate means of carrying off surplus water. Most of the rivers rise in the upland plain and flow into Minas Basin.

The climate of Hants county is humid temperate. The annual precipitation averages about 40 inches and about 14 inches falls during the growing season. There is some difference between the precipitation on the lowland and on the upland. Data show that there may be local points having a deficiency of moisture during the summer months. The mean daily temperature for the year averages 44 degrees, ranging from 60 degrees in summer to 21 degrees in the winter months. Along the shore, spring planting is often delayed by wet weather. The average growing season ranges from 175 to 200 days. The principal tree cover consists of maple, beech, birch, spruce, hemlock, poplar, fir, and tamarack. More than 80 per cent of the county is covered with trees or shrubs.

The population of Hants county is 22,034 of which about 90 per cent are of British stock. Hants county has good highway, railroad, and shipping facilities for getting farm produce to market.

Under the climatic conditions prevailing in the area, the soils that are developed belong to the Podzol group. These are leached, acid soils which, under forest cover, develop a grey layer under the surface organic mat. Under this there is a yellowish to reddish-brown horizon which rests on a greyish-brown to reddish-brown parent material at depths ranging from 15 to 30 inches. About 90 per cent of the soils are developed from glacial till and 4 per cent from water-deposited materials. The remainder of the area is occupied by lakes and swamps. In general, the soils developed from sandstones are coarse textured, while those from shales are fine textured. The soils in Hants county derive much of their color from their parent rocks.

The soils were mapped as catenas—a catena including all soils developed on similar parent material and in some cases the drainage members or series were mapped out. The nature and properties of these soils are described in the report. The soils best suited to agriculture are the Stewiacke, Acadia, Cumberland, Truro, Pugwash, Queens, and Hantsport soils. The water-

deposited soils are especially valuable but are sometimes limited in their use by danger of flooding. The Queens soils are the most widely farmed soils in the county. They are fine textured and when well drained are suitable for most crops grown in the area. Where drainage is not so good, hay and grain are the most suitable crops.

The Rawdon, Elmsdale, and Hansford soils are not quite so suitable for agriculture due to their topography or stoniness or a combination of these factors. The coarser-textured water-deposited soils such as the Hebert, Torbrook, and Cornwallis soils have a tendency to be droughty and for this reason they are usually left under forest or sometimes used for pasture. The Gibraltar and Halifax soils are best suited to forest. Swampy areas throughout the county are useless at present. About 16 per cent of the area is highly favorable for the production of crops. Another 40 per cent is suitable for crop production with reasonable care when good management practices are followed. The remainder is more suitable for forestry.

Early agriculture in Hants county dates from the settlement by the French about 1703. Hay, corn, and wheat were the principal early crops, but at present, hay, oats, barley, potatoes, roots, and mixed grain form the principal farm crops. About 40 per cent of the county is occupied by farms of which about 23 per cent is improved land. Mixed farming and dairying are the leading occupations and considerable orcharding is carried on also. The main agricultural areas occur along the shore of Minas Basin and the estuaries of the Avon and Shubenacadie rivers. Nearly all farms keep some livestock and about 90 per cent of the field crop acreage is devoted to hay. Hants county ranks third in. volume of milk production in the province. The number of poultry kept has increased considerably in the past few years.

The management of Hants county soils involves the maintenance of organic matter, the use of lime, rotations, and the use of commercial fertilizer and manure.

On some of the fine-textured soils tillage practices and seedbed preparation are almost as important as the maintenance of fertility.

On most of the cultivated soils and cleared land in Hants county, some erosion is taking place. Where slopes are in hay or permanent pasture, this erosion is probably very small, but on old fields where organic matter has been depleted and fertility is low, sheet erosion and the development of rills and gullies is facilitated.

In the cultivation of hoed crops on such soils as the Truro, Pugwash, or Queens care must be taken to prevent washing down the slopes. It is not known what slopes may be considered as critical but generally slopes over five per cent will erode fairly easily on these soils.

Soil management is steadily becoming recognized as a very important factor in the economic production of crops and there is room for considerable improvement along this line.

MAPS
NOT
FILMED

CARTES
OMISES